

LEADER

Instruments Corporation

The surprising leader.



LEADER's new headquarters building in Hauppauge, New York contains the U.S. executive offices, East Coast warehouse and service center.

Since its beginning 26 years ago LEADER has earned a worldwide reputation for designing and manufacturing some of the most reliable, practical, and cost effective electronic instruments available. LEADER products were originally developed for production test applications where high reliability, and ease of use are essential qualities. When the company added general purpose instruments to its product line, these qualities were retained along with a cost-performance ratio unequalled in the industry.

This 1980/81 catalog describes over 50 LEADER products which are being specified more and more by engineers for research, development, production, and service applications. There are over 100 additional LEADER instruments which have been custom-designed for production test applications. For information on these, or having a special instrument designed for your unique application, please contact LEADER headquarters in Hauppauge, New York.

Whatever your industry or specific application, there is likely to be a LEADER instrument that will surprise you with more performance and reliability than you thought possible.

- **Surprising fact**—Less than 1% of all LEADER products are returned for service during the 2-year warranty period.
- **Surprising fact**—No waiting for LEADER instruments. Off-the-shelf deliveries anywhere in the United States from over 100 "Select" stocking distributors...backed by East and West Coast factory warehouses.
- **Surprising fact**—All LEADER instruments are designed and tested to withstand a broad range of extreme environmental conditions.
- **Surprising fact**—Every LEADER instrument is carefully performance tested before shipment.
- **Surprising fact**—LEADER instruments are specified by engineers in over 80 countries.
- **Surprising fact**—A free trial use of any LEADER instrument is available to qualified companies.

LEADER INSTRUMENTS CORP.
PRICE LIST

Effective
March 1, 1980

380 Oser Avenue
Hauppauge, NY 11787
(516) 231-6900

Model No.	Description	Unit Price
OSCILLOSCOPES		
LBO-302	10 MHz, D.T., 3" Compact	\$ 790.00
LBO-308S	20 MHz, D.T., 3" Portable AC/DC	950.00
LBO-310A	4 MHz, S.T. Recur. Sweep	275.00
LBO-507A	20 MHz, S.T., 5"	610.00
LBO-508A	20 MHz, D.T., 5"	835.00
LBO-511	10 MHz, S.T., 5"	420.00
LBO-513	10 MHz, S.T., 1mV Sens.	495.00
LBO-514	10 MHz, D.T., 1mV Sens.	645.00
LBO-515B	30 MHz, D.T. Cal. Delayed Sweep	1,530.00
LBO-520	30 MHz, D.T. w/Delay Line	1,100.00
VIDEO GENERATORS		
LCG-395A	Video Color Signal Source	300.00
LCG-396	NTSC Color Bar/Pattern Gen.	995.00
LCG-397	RF/IF/Video Generator	230.00
LCG-400M	Video Generator w/Multiburst	1,895.00
LCG-400S	Video Generator w/Sweep	1,895.00
FREQUENCY COUNTERS		
LDC-821S	60 MHz, 5 digit, 5 ppm	259.00
LDC-822	80 MHz, 7 digit, 5 ppm	300.00
LDC-823S	250 MHz, 8 digit, 1 ppm	450.00
LDC-823S-1	250 MHz, 8 digit, 0.03 ppm	775.00
LDC-824S	520 MHz, 8 digit, 1 ppm	550.00
LDC-824S-1	520 MHz, 8 digit, 0.03 ppm	875.00
METERS/BRIDGES		
LCR-740	LCR Bridge	350.00
LDM-851	3½ Digit DMM w/AC Adapter	169.00
LEM-73A	Bench FET Multimeter	198.00
LHM-80A	High Voltage Meter/Probe	39.00
LPM-880	R.F. Power Meter, 500 MHz, 120W	189.00
LT-70B	V.O.M., 20 Kohm/volt	50.00
TRANSISTOR CURVE TRACER/CHECKER		
LTC-905	Curve Tracer	230.00
LTC-906	Transistor Checker	189.00
FUNCTION GENERATORS		
LFG-1300S	Function Generator	495.00
AUDIO INSTRUMENTS		
LAG-26	Sine/Sq. Wave Gen., 200 KHz	165.00
LAG-120A	Sine/Sq. Wave Gen., 1 MHz, 0.05% dist.	280.00
LAG-125	Sine/Sq. Wave Gen., 1 MHz, 0.03% dist.	525.00
LAS-5500	Audio System Analyzer	1,995.00
LAT-45	Attenuator, 0-101 db, 0.1 db Steps	225.00
LAT-47	Attenuator, 0-121 db, 0.1 db Steps	375.00
LDM-170	Total Harmonic Distortion Meter	670.00
LFM-39A	Wow, Flutter & Drift Meter (3 KHz ref.)	890.00
LFM-39A-01	Wow, Flutter & Drift Meter (3 KHz, 3.15 KHz)	950.00
LFR-5600	Frequency Response Recorder	3,195.00
LMV-181A	A.C. Millivolt Meter	235.00
LMV-185A	A.C. Millivolt Meter, 2 Chan.	390.00
LD-21	Audio Dummy Load	70.00



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Model No.	Description	Unit Price
RF INSTRUMENTS		
LSG-16	R.F. Signal Generator, 300 MHz	165.00
LSG-231	FM Stereo Generator	390.00
LSW-333	VHF/UHF TV/FM Sweep Marker Gen.	755.00
LFC-944B	VHF/UHF TV Field Strength Meter	512.00
LCC-138	Calibrated VHF/UHF TV Signal Gen.	244.00
SPECIAL ORDER PRODUCTS*		
LMG-270	Insulation Tester/Meg Ohm Meter	211.00
LCG-393	PAL-B Color Bar Generator	304.00
LCG-396 PAL	PAL Version of LCG-396	1,050.00
LCG-398	SECAM III Color Bar Generator	1,345.00
LBO-9S	9" Alignment Oscilloscope	833.00
LAV-191	Audio Test Set	793.00
LMV-182A	High Sens. AC Millivolt Meter	309.00
LSP-5621	Speaker Analyzer for LFR-5600	1,995.00
LEA-5610	Equalizer/Amplifier for LFR-5600	845.00
LBO-5810	Programmable Oscilloscope	2,614.00
LBO-5810P	Programmable Oscilloscope w/Ind. Lamps	3,614.00
LPC-5811A	Program Control Unit	741.00
LPC-5812	Programmer	1,058.00
LPC-5813	Multi-Probe Controller	582.00
ACCESSORIES		
LP-7X	Demodulator/Low Cap; BNC Conn.	18.50
LP-16AX	Direct/Low Cap Probe; BNC Conn.	38.00
LP-17AX	x10/x100 Probe, BNC Conn.	50.00
LP-18AX	100 MHz, x10 Probe	50.00
LP-6	HV Probe for LDM-851	48.50
LP-11	Leader-Flex Probe (3 Prong) for LTC-905	16.50
LP-11Y	In Circuit Probe for LTC-906	19.00
LC-19	AC Clamp on Adapter for LDM-851	39.95
LPS-166F	AC Adapter for LDM-851,LCG-397(6V DC)	7.95
LPS-169A	AC Adapter for LTC-906 (9V DC)	8.95
LPS-168	AC Adapter for LCC-138 (12V DC)	9.95
CC-70B	Carrying Case for LT-70B	4.95
CC-302	Carrying Case for LBO-302	35.00
CC-851	Carrying Case for LDM-851, LCG-397	8.95
LC-2215	Carrying Case for LBO-308S	35.00
LP-2054	Battery Pack for LBO-308S	75.00
LP-2003	Probe Pouch for LBO-520	23.95
LP-2004	Probe Pouch for LBO-507A,508A,513,514	19.95
LP-2005	Probe Pouch for LBO-515B	23.95
LRA-508	Rackmount for LBO-507A,508A,513,514,520	85.00
LRA-515	Rackmount for LBO-515B	85.00
LC-2001	Front Cover for LBO-507A,508A,513,514,520	39.95
LC-2002	Front Cover for LBO-515B	39.95
LC-2003	Front Cover for LBO-308S	39.95
LC-056	Log Chart Paper for LFR-5600	9.50
LC-057	Linear Chart Paper for LFR-5600	9.50
LI-068	50 cc Red Ink for LFR-5600	5.00

All prices and specifications are subject to change without notice.

*Special Products are non-returnable, check with factory for availability.



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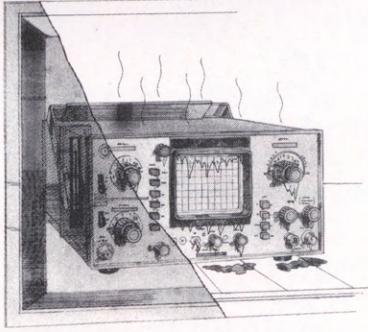
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Quality Assurance.

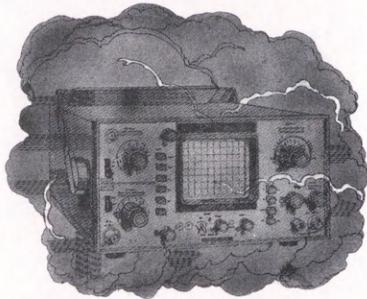
All LEADER products are subjected to a rigorous quality assurance program designed to ensure trouble-free performance for many years.

Actual long term reliability data generated by our Warranty Service Centers is used to continually update equipment designs and quality assurance tests and procedures. As a result, LEADER offers instruments with proven reliability that equals or exceeds any other instrument manufacturer ... regardless of price.



ENVIRONMENTAL TESTING.

Prototypes of all new products are subjected to extreme temperatures, humidity, vibration and shock before the product goes into production. In addition, 10% of the units from the first production run are subjected to the full environmental tests. Should even one failure occur, the entire production run is tested and any design defects which are revealed are corrected. After the first production run, samples of successive production are tested to assure that no weaknesses have developed in components or manufacturing procedures.

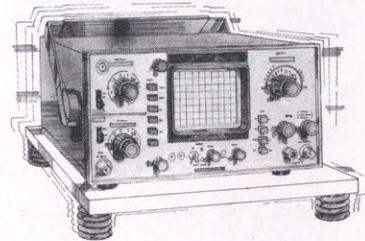


PERFORMANCE TESTING.

In every production run 100% of the units are performance tested to ensure that all published and internal specifications are met. Accurate records are maintained to detect any recurrent problems which may require retesting an entire production run before any units are released for shipment.

RELIABILITY.

Reliability is a very important feature of all LEADER products. It is one of the primary reasons more companies specify LEADER products each year. Reliability is also the primary reason we are able to offer a liberal two-year warranty on all LEADER products.



Oscilloscope Selection Chart

Model	Bandwidth (MHz)	Sens. (mV/Div)	Traces	Display (cm)	DISPLAY								TRIGGERING							
					ADD/SUB	DELAY LINE	UNCAL LAMPS	VERT MAG	HORIZ MAG	Z-AXIS MOD	TRACE ROTATION	CH-1/CH-2	TV	SLOPE	+/	AUTO	SINGLE SHOT	DELAYED	HOLDOFF	
LBO-515B	30	5	Dual	6.4x8	x	x	x		x10	x	x	x	x	x	x	x	x	x	x	
LBO-520	30	5	Dual	8x10	x	x	x		x10	x	x	x	x	x	x	x	x	x	x	
LBO-5800	20	5	Dual	8x10	x				x5	x	x	x	x	x	x	x	x	x		
LBO-508A	20	10	Dual	8x10	x				x5	x	x	x	x	x	x	x	x	x		
LBO-507A	20	10	Single	8x10	x				x5	x	x			x	x	x	x	x		
LBO-514	10	1	Dual	8x10				x5	x5	x	x	x	x	x	x	x	x	x		
LBO-513	10	1	Single	8x10				x5	x5	x	x		x	x	x	x	x	x		
LBO-308S	20	2	Dual	4.8x6	x				x5	x	x	x	x	x	x	x	x	x		
LBO-302	10	10	Dual	4.8x6	x				x5	x		x		x	x	x	x	x		
LBO-511	10	20	Single	8x10						x										
LBO-310A	4	20	Single	4.8x6						x										

30-MHz Dual Trace, Dual Time Base Oscilloscope



LBO-515B

The LBO-515B is a compact, extremely versatile oscilloscope for both lab and field use. Its 30-MHz bandwidth and 5-mV sensitivity make it suitable for a broad range of applications in design, testing and servicing of both digital and analog circuits and equipment. A 4-inch internal graticule PDA CRT provides sharp, bright displays even at highest sweep rates. The dual time base with calibrated delay time permits accurate observation and time interval measurements of complex waveforms.

SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB, 8 div.)
dc: 0 Hz to 30 MHz.
ac: 2 Hz to 30 MHz.

Rise Time

11.7 ns.

Deflection Coefficients

5 mV/div to 5 V/div in 10 steps, 1-2-5 sequence, continuously variable between steps, uncalibrated warning lights.

Accuracy

± 3% (0-40°C).

Input Impedance

1 MΩ, 35 pF.

Maximum Input

600 V (dc plus ac peak).

Signal Delay

120 ns.

Display Modes

CH-1, CH-2, alternate, chop (250 kHz), add, subtract (CH-2 invert).

Common Mode Rejection Ratio

26 dB at 1 kHz.

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE)

Input

Via CH-1 vertical amplifier.
Bandwidth (-3 dB, 10 div.)
dc: 0 Hz to 1 MHz.
ac: 2 Hz to 1 MHz.

Rise Time

350 ns.

Phase Shift

<3° at 100 kHz.
All other external horizontal deflection specifications are identical to vertical deflection.

INTERNAL HORIZONTAL DEFLECTION

Display Modes

Main time base, main time base intensified by delayed time base, delayed time base.

Main Time Base

0.2 μs/div to 0.5 s/div in 20 steps, 1-2-5 sequence, continuously variable between steps, uncalibrated warning light.

Delayed Time Base

0.2 μs/div to 0.1 s/div in 18 steps, 1-2-5 sequence.

Magnifier

Times 10 magnifier extends maximum sweep rate to 20 ns/div.

Accuracy

±3% (±5% with magnifier).

MAIN TIME BASE TRIGGERING

Sources

Internal CH-1 and CH-2.
External.

Modes

Auto (≥20 Hz).
Normal.
Single.

Coupling

ac, dc (external triggering only), HF REJ (10-kHz cutoff), TV (automatic selection of line or frame filtering by position of TIME/DIV control).

Slope

+ or -.

Sensitivity

Internal: 0.5 div.
External: 0.1 V p-p.

External Input

Impedance: 1 MΩ, 30 pF.
Maximum Level: 600 V (dc plus ac peak).

Hold-Off

Variable sweep hold-off control permits stable triggering on complex waveforms.

DELAYED TIME BASE TRIGGERING MODES

Immediate: delayed time base begins immediately after delay time.
Triggered: delayed time base begins on the first trigger after the delay time.

Delay Time Jitter

<0.01% (1 part in 10,000) of 10 times the main time base (A TIME/DIV setting). All other delayed time base specifications are identical to main time base specifications.

Z-AXIS (INTENSITY) MODULATION

Input Level
TTL compatible.
Maximum Input
50 V p-p.

INTERNAL CALIBRATOR

Output
0.5 V p-p, ±3%.

Wave Shape
Square wave, 1 kHz nominal.

CRT DISPLAY

Phosphor
P 31 (P 7 optional).

Graticule

Internal, illuminated 8 x 10 div (1 div = 0.8 cm).

ACCELERATING POTENTIALS

6 kV and 1.2 kV (post deflection).

TRACE ALIGNMENT

Front panel trace rotation control.

POWER REQUIREMENTS

115/230 Vac, ±13%, 50 to 60 Hz, 40 VA.

PHYSICAL

Size (W x H x D)
11 1/8 x 5 1/4 x 14 1/8 in.
290 x 135 x 360 mm.

Weight

18 lbs., 5 oz.
8.3 kg.

ENVIRONMENTAL

Temperature (Operating)
0-40°C.

Vibration

2 mm p-p displacement at 12 to 33 Hz.

Shock

30 g.

SUPPLIED ACCESSORIES

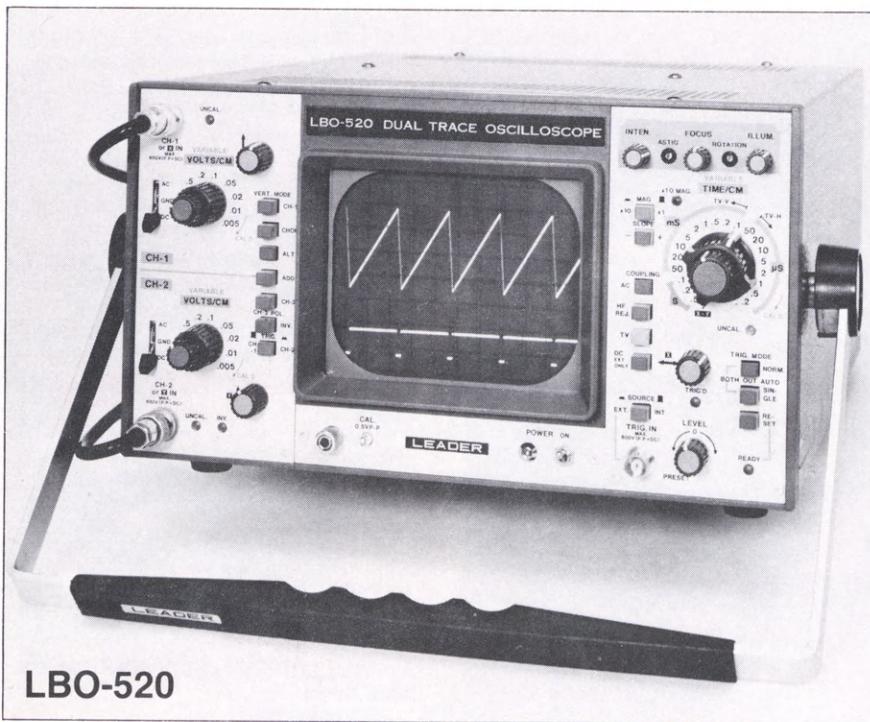
Instruction Manual.
Two (2) Type LP-16AX switchable X1/X10 Probes.

AVAILABLE ACCESSORIES

(See pages 12 & 13.)

LP-2005 Probe Pouch.
LC-2002 Protective Front Cover.
LRA-515 Rack Mounting Adapter.

30-MHz Dual Trace Oscilloscope with Delay Lines



LBO-520

The LBO-520 is designed to meet a broad range of requirements for a versatile, medium bandwidth oscilloscope with high reliability at moderate cost. Its bright PDA CRT, signal delay lines and comprehensive display and triggering controls make it suitable for use in the design lab, production test, or service departments. Convenience features such as uncalibrated warning lamps, trace rotation control, and color-coded front-panel ensure easy, error-free operation.

SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB, 8 cm)
dc: 0 Hz-30 MHz.
ac: 2 Hz-30 MHz.

Rise Time
11.7 ns.

Deflection Coefficients

5 mV/cm to 5 V/cm, in 10 calibrated steps, 1-2-5 sequence, continuously variable between steps, uncalibrated warning lights.

Accuracy
± 3% (0-40° C).

Input Impedance
1 MΩ, 35 pF.

Maximum Input

600 V (dc plus ac peak).

Signal Delay

120 ns.

Display Modes

CH-1, CH-2, alternate, chop (230 kHz add, subtract (CH-2 invert).

Common Mode Rejection Ratio
26 dB at 1 kHz.

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE)

Input
Via CH-1 vertical amplifier.

Bandwidth (-3 dB, 8cm)
dc: 0 Hz to 1 MHz.
ac: 2 Hz to 1 MHz.

Rise Time

350 ns.

Phase Shift

<3° at 100 kHz.
All other external horizontal deflection specifications are identical to vertical deflection.

INTERNAL HORIZONTAL DEFLECTION (SWEEP MODE)

Deflection Coefficients (Sweep Rate)
0.2 μs/cm to 0.5 s/cm in 20 calibrated steps, 1-2-5 sequence, continuously variable between steps, uncalibrated warning light.

Magnifier

Times 10 magnifier extends maximum sweep rate to 20 ns/cm.

Accuracy

± 3% (± 5% with magnifier).

TRIGGERING

Sources

Internal CH-1 and CH-2.
External.

Modes

Auto (≥20 Hz).
Normal.
Single.

Coupling

ac, dc (external triggering only), HF REJ (10 kHz cutoff), TV (Automatic selection of line or frame filtering by position of TIME/CM control).

Slope

+ or -.

Sensitivity

Internal: 0.5 cm.
External: 0.1 V p-p.

External Input

Impedance: 1 MΩ, 30 pF.
Maximum Level: 600 V (dc plus ac peak).

Z-AXIS (INTENSITY) MODULATION

Input Level

TTL compatible.

Maximum Input

50 V p-p.

INTERNAL CALIBRATOR

Output

0.5 V p-p, ± 3%.

Wave shape

Square wave, 1 kHz nominal.

CRT DISPLAY

Phosphor

P 31 (P 7 optional)

Graticule

External, illuminated 8 x 10 cm with rise time calibration.

Accelerating Potential

4.8 kV and 1.2 kV (post deflection).

Trace Alignment

Front panel trace rotation control.

POWER REQUIREMENTS

115/230 Vac ± 13%, 50 to 60 Hz, 40 VA.

PHYSICAL

Size (W x H x D)

11 1/2 x 6 1/4 x 14 3/4 in.
290 x 160 x 375 mm.

Weight

19 lbs, 8.5 kg.

ENVIRONMENTAL

Temperature (Operating)
0-40° C.

Vibration

2 mm p-p displacement at 12 to 33 Hz.

Shock

30 g.

SUPPLIED ACCESSORIES

Instruction Manual.
Two (2) type LP-16AX Switchable x1/x10 Probes.

AVAILABLE ACCESSORIES

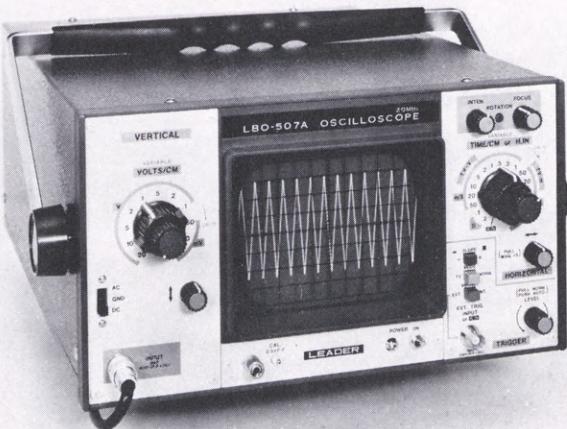
(See pages 12 & 13.)

LP-2004 Probe Pouch.

LC-2001 Protective Front Cover.

LRA-508 Rack Mount Adapter.

20-MHz Single and Dual Trace Oscilloscopes.



LBO-507A

The single trace LBO-507A and the dual trace LBO-508A are both economical and versatile... proven performers for a wide range of lab and field work from studying IF responses to microprocessor analysis. Both oscilloscopes offer a 17.5-nsec rise time, 18 calibrated sweep speeds and a full range of triggering options. The add and subtract modes of the dual trace LBO-508A permit differential, phase-shift, and similar measurements. Both have a 5-inch CRT with 8 x 10-cm graticule.

SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB, 4 cm)
dc: 0 Hz to 20 MHz.
ac: 2 Hz to 20 MHz.

Rise Time

17.5 ns.

Deflection Coefficients

10 mV/cm to 20 V/cm in 11 calibrated steps, 1-2-5 sequence, continuously variable between steps, uncalibrated warning lights.

Accuracy

$\pm 3\%$ (0-40°C).

Input Impedance

1 M Ω , 35 pF.

Maximum Input

600 V (dc plus ac peak).

Display Modes (LBO-508A only)

CH-1, CH-2, alternate (0.5 to 200 μ s/cm), chop (0.5 to 200 ms/cm), chop frequency is 250 kHz nominal, add, subtract (CH-2 invert).

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE) LBO-507A

Input

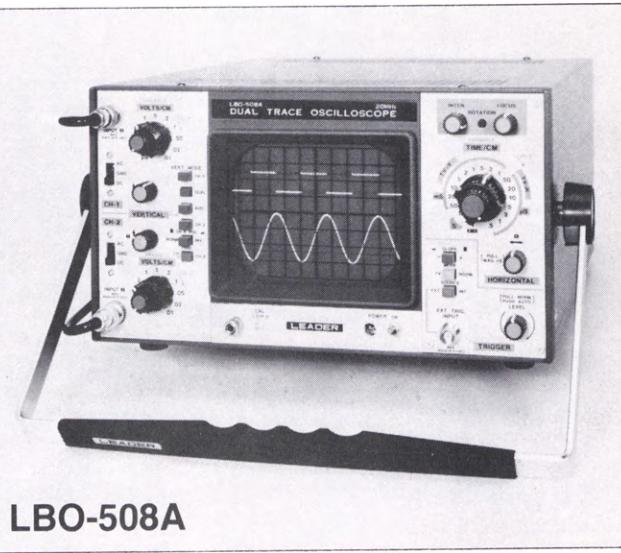
Via external trigger connector.

Deflection Coefficients

200 mV/cm to 5 V/cm.

Bandwidth (-3 dB, 10 cm)

dc - 250 kHz.



Rise Time
1.4 ms.

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE) LBO-508A

Input
Via CH-1 input connector.

Deflection Coefficients
See vertical specifications.

Bandwidth (-3 dB, 10 cm)
dc - 800 kHz.

Rise Time
440 ns.

Phase Shift
 $<3^\circ$ at 100 kHz.

INTERNAL HORIZONTAL DEFLECTION (SWEEP MODE)

Deflection Coefficients (Sweep Rates)
0.5 μ s/cm to 200 ms/cm in 18 calibrated steps, 1-2-5 sequence, continuously variable between steps with uncalibrated warning light.

Magnifier
Times 5 magnifier extends maximum sweep rate to 100 ns/cm.

Accuracy
 $\pm 3\%$ ($\pm 5\%$ with magnifier).

TRIGGERING

Sources
Internal CH-1, internal CH-2 (LBO-508A only), external.

Modes

Auto (≥ 50 Hz).
Normal.

Coupling

Normal or TV (automatic selection of line or frame filtering by position of TIME/CM control).

Slope

+ or -.

Sensitivity

Internal: 0.5 cm.
External: 100 mV p-p.

External Input

Impedance: 1 M Ω , 20 pF.
Maximum Level: 600 V (dc pulse ac peak).

Z-AXIS (INTENSITY) MODULATION

Input Level
TTL compatible.

Maximum Input
50 V p-p.

INTERNAL CALIBRATOR

Output Level
0.5 V p-p, $\pm 3\%$.

Waveshape
Square wave, line frequency.

CRT DISPLAY

Phosphor
P 31 (P 7 optional)

Graticule
External, 8 x 10 cm with rise-time calibration.

Accelerating Potential
2 kV.

Trace Alignment

Front panel trace rotation control.

POWER REQUIREMENTS

115/230 Vac $\pm 13\%$, 50 to 60 Hz, 32 VA.

PHYSICAL

Size (W x H x D)
10 $\frac{3}{8}$ x 6 $\frac{7}{8}$ x 14 $\frac{3}{4}$ in.
290 x 160 x 375 mm.

Weight
15 lbs, 7kg.

ENVIRONMENTAL

Temperature (Operating)
0-40°C.

Vibration
2 mm p-p displacement at 12 to 33 Hz.

Shock

30 g.

SUPPLIED ACCESSORIES

Instruction Manual.
Type LP-16AX switchable X1/X10 Probes
(Two with LBO-508A, one with LBO-507A).

AVAILABLE ACCESSORIES

(See accessories page)

LP-2004 Probe Pouch.
LC-2001 Protective Front Cover.
CA-101 Hand Held Camera.
LRA-508 Rack Mount Adapter.

10-MHz Single and Dual Trace High-Sensitivity Oscilloscopes



LBO-513

The single trace LBO-513 and the dual trace LBO-514 are compact 5-inch oscilloscopes that offer maximum performance at low cost. Equipped with both vertical and horizontal magnifiers, they have 1-mV sensitivity with X5 magnification and a maximum sweep speed of 0.1 μ s/cm (0.2 s/cm to 0.5 μ sec in 18 calibrated steps plus X5 magnification). Rise time of both oscilloscopes is 35 ns with normal and automatic, + or - triggering. The LBO-514 provides both chop and alternate dual trace displays.

SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB, 4 cm)

dc: 0 Hz to 10 MHz.
ac: 2 Hz to 10 MHz.

Rise Time

35 ns.

Deflection Coefficients

5 mV/cm to 10 V/cm in 11 calibrated steps, 1-2-5 sequence, continuously variable up to 2.5 times setting between steps, uncalibrated warning light; sensitivity increased to 1 mV/cm by X5 vertical magnifier.

Accuracy

\pm 3% (0-40° C).

Input Impedance

1 M Ω , 35 pF.

INTERNAL HORIZONTAL DEFLECTION (SWEEP MODE)

Deflection Coefficients (Sweep Rates)

0.5 μ s/cm to 200 ms/cm in 18 calibrated steps, 1-2-5 sequence, continuously variable between steps with uncalibrated warning light.

Magnifier

Times 5 magnifier extends maximum sweep rate to 100 ns/cm.

Accuracy

\pm 3% (\pm 5% with magnifier).

TRIGGERING

Internal CH-1.
Internal CH-2 (LBO-514 only).
External.

Maximum Input

600 V (dc plus ac peak).

Display Modes (LBO-514 only)

CH-1, CH-2, alternate, chop, (chop frequency is 250 kHz nominal), add, subtract (CH-2 invert).

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE) LBO-513

Input

Via external trigger connector.

Deflection Coefficients

200 mV/cm to 5 V/cm.

Bandwidth (-3dB, 10 cm)

dc-250 kHz.

Rise Time

1.4 μ s.

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE) LBO-514

Input

Via CH-1 vertical input connector.

Deflection Coefficients

See vertical specifications.

Bandwidth (-3 dB, 10 cm)

dc-800 kHz.

Rise Time

440 ns.

Phase Shift

<3° at 100 kHz.

TRIGGERING

Sources

Internal CH-1.
Internal CH-2 (LBO-514 only).
External.

Modes

Auto (\geq 50 Hz).

Normal.

Coupling

Normal or TV (automatic selection of line or frame filtering by position of TIME/CM control).

Slope

+ or -.

Sensitivity

Internal: 1 cm.

External: 200 mV p-p.

External Input

Impedance: 100 k Ω , 50 pF.

Maximum Level: 100 V (dc plus ac peak).



LBO-514

Z-AXIS (INTENSITY) MODULATION

Input Level

TTL compatible.

Maximum Input

50 V p-p.

INTERNAL CALIBRATOR

Output Level

0.5 V p-p, \pm 3%.

Waveshape

Square wave, 1 kHz.

CRT DISPLAY

Phosphor

P 31 (P7 optional)

Graticule

External, 8 x 10 cm with rise-time calibration.

Accelerating Potential

1.8 kV stabilized.

Trace Alignment

Front panel trace rotation control.

POWER REQUIREMENTS

115/230 Vac \pm 13%, 50 to 60 Hz, 33 VA.

PHYSICAL

Size (W x H x D)

10 $\frac{3}{8}$ x 6 $\frac{7}{8}$ x 14 $\frac{3}{4}$ in.

290 x 160 x 375 mm.

Weight

12 lbs, 5.5 kg.

ENVIRONMENTAL

Temperature (Operating)

0 to 40° C.

Vibration

2 mm p-p displacement at 12 to 33 Hz.

Shock

30 g.

SUPPLIED ACCESSORIES

Instruction Manual

Type LP-16AX switchable X1/X10 Probes (two with LBO-514, one with LBO-513).

AVAILABLE ACCESSORIES

(See pages 12 & 13)

LP-2004 Probe Pouch.

LC-2001 Protective Front Cover.

LRA-508 Rack Mount Adapter.

20-MHz Dual Trace Portable Oscilloscope



LBO-308S

The LBO-308S delivers "lab performance" in a compact package that's perfect for field work. Its broad range of capabilities include 2-mV sensitivity, 17.5 ns rise time, X-Y operation with full sensitivity, and add/subtract modes not normally available in oscilloscopes of this size. It may be operated from either 115/230 Vac, 50-60 Hz, 12 Vdc or an optional 2-hour battery pack. The battery pack mounts internally and is automatically charged whenever the unit is connected to a source of ac power. The 3-inch rectangular CRT contains an internal graticule for parallax free measurements at any viewing angle. The LBO-308S has 18 calibrated sweep rates with a $\times 5$ magnifier (0.1 μ s/div. max) and calibrated 12-step vertical attenuators (with continuous adjustment between steps). A rugged, compact scope with performance unsurpassed in its price range.



SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB, 4 div)

dc: 0 Hz to 20 MHz.
ac: 2 Hz to 20 MHz.

Rise Time:

17.5 ns.

Deflection Coefficients

2 mV/div to 10 V/div in 12 calibrated steps, 1-2-5 sequence, continuously variable between steps, uncalibrated warning light.

Accuracy

$\pm 3\%$ (0-40° C).

Input Impedance

1 M Ω , 35 pF.

Maximum Input

600 V (dc plus ac peak).

Display Modes

CH-1, CH-2, chop (0.2 S/div to 0.5 ms/div), alternate (0.2 ms/div to 0.5 μ s/div), add, subtract (CH-2 invert).

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE)

Input

Via CH-1 vertical amplifier.

Bandwidth (-3 dB, 10 div)

dc: 0 Hz to 1 MHz.
ac: 2 Hz to 1 MHz.

Rise Time

350 ns.

Phase Shift

<3° at 100 kHz.

Deflection Coefficients (Sweep Rates)

0.5 μ s/div to 0.2 s/div in 18 calibrated steps, 1-2-5 sequence continuously variable between steps, uncalibrated warning light.

Magnifier

Times 5 magnifier extends maximum sweep rate to 0.1 μ s/div.

Accuracy

$\pm 3\%$ (5% with magnifier).

TRIGGERING

Sources

Internal CH-1 or CH-2.
External.

Modes

Auto (≥ 50 Hz).
Normal.
Single shot.

Coupling

Normal (ac).
HF REJ (Video frame rate filter).

Slope

+ or -.

Sensitivity

Internal: 1 div.
External, AUTO: 400 mV p-p.
External, Normal: 500 mV p-p.

External Input

Impedance: 100 k Ω , 47 pF.
Maximum Level: 600 V (dc plus ac peak).

Z-AXIS (INTENSITY) MODULATION

Input Level

TTL Compatible.

Maximum Input

50 V p-p.

INTERNAL CALIBRATOR

Output

0.1 V p-p $\pm 3\%$.

Wave Shape

Square wave, 1 kHz.

CRT DISPLAY

Phosphor

P 31 (P7 optional)

Graticule

Internal 8 x 10 div (1 div = 6 mm) with rise time calibration.

Accelerating Potential

1,500 V stabilized.

Trace Alignment

Front panel trace rotation control.

POWER REQUIREMENTS

100/117/200/217/234 Vac $\pm 13\%$, 50-60 Hz (normally supplied wired for 117 Vac) or 11 to 30 Vdc, 800 mA.

PHYSICAL

Size (W x H x D)

9 1/5 x 4 3/5 x 12 3/5 in.
233 x 118 x 320 mm.

Weight

Oscilloscope: 10.9 lbs, 5 kg.
Battery Pack: 1.8 lbs, 0.8 kg.

ENVIRONMENTAL

Temperature (Operating)

0-40° C.

Vibration

2 mm p-p displacement at 12 to 33 Hz.

Shock

30 g.

SUPPLIED ACCESSORIES

Instructional Manual.

Two (2) type LP-16AX switchable x1/x10 probes.

One (1) ac power cable.

One (1) dc power cable.

AVAILABLE ACCESSORIES

(See pages 12 & 13)

LC-2003 Protective Front Cover.

LC-2215 Carrying Case.

LP-2054 Battery Pack.

Compact, 3-inch, 10-MHz Dual Trace Oscilloscope



The LBO-302 is a compact oscilloscope offering a full compliment of display modes and triggering capabilities. It is ideal for field service work requiring a small, rugged, lightweight instrument. The unit easily stows under an airline seat and has the durability to withstand many years of travel. The LBO-302 offers performance not normally found in compact oscilloscopes. Dual channels may be displayed separately, alternately, or chopped. Triggering is selected from either vertical channel or external sources, auto or normal modes with + or - slope. Other features include: Z-axis modulation, switches for direct X and Y inputs, 17 calibrated sweep rates with X5 magnifier, and vector scope operation.

SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB)

dc: 0 Hz to 10 MHz.
ac: 2 Hz to 10 MHz.

Rise Time

35 ns.

Deflection Coefficients

10 mV/div to 5 V/div (1 div = 6 mm)
in 9 calibrated steps, 1-2-5 sequence,
continuously variable between steps.

Accuracy

± 3%.

Input Impedance

1 MΩ, 35 pF.

Maximum Input

600 V (dc plus ac peak).

Display Modes

CH-1, CH-2
Alternate (0.5 ms/div to 1 μs/div)
Chop (0.2 s/div to 1 ms/div)
Add, Subtract (CH-2 Invert).

EXTERNAL HORIZONTAL DEFLECTION (X-Y Mode)

Bandwidth (-3 dB)

2 Hz to 200 KHz.

Deflection Coefficient

200 mV/div to 5 V/div using magnifier
and horizontal variable controls.

Maximum Input

600 V (dc plus ac peak).

INTERNAL HORIZONTAL DEFLECTION (Sweep Mode)

Deflection Coefficient (Sweep Rates)

1 μs to 0.2 s/div in 17 calibrated steps,
1-2-5 sequence, continuously variable
between steps to 0.5 s/div, plus preset
video-V, 2 - frame rate (33.3 ms/10 div)
and video-H, 2 - Line rate (127 μs/10 div)
for viewing composite video signals.

Magnifier

Times 5 magnifier extends maximum
sweep rate to 200 ns/div.

Accuracy

± 5% (± 10% with magnifier).

TRIGGERING

Sources

Internal CH-1 and CH-2.
External.

Modes

Auto (≥50 Hz).
Normal.

Slope

+ or -.

Sensitivity

Internal: 1 div to 16 div.
External: 100 mV to 2 V.

Maximum Input

600 V (dc plus ac peak).

Z-AXIS (INTENSITY) MODULATION LEVEL

5 V p-p.

INTERNAL CALIBRATOR

Output Level

0.5 V p-p ± 3%.

Wave Shape

1 kHz square wave.

CRT DISPLAY

Phosphor

P 31 (P 7 optional)

Area

48 x 60 mm.

Graticule

External 8 x 10 div (1 div = 6 mm)
with rise time calibration.

Accelerating Potential

1,500 V stabilized.

POWER REQUIREMENTS

100/115/230 Vac, 50 to 60 Hz,
30 VA (normally supplied wired for
115 Vac).

PHYSICAL

Size (W x H x D)

7 1/8 x 4 3/4 x 11 1/4 in.
200 x 120 x 300 mm.

Weight

10 lbs., 4.5 kg.

ENVIRONMENTAL

Temperature (Operating)

0-40°C.

Vibration

2 mm p-p displacement at 12 to 33 Hz.

Shock

30 g.

SUPPLIED ACCESSORIES

Instruction Manual.
Two (2) Type LP-16AX Probes
(Switchable x1/x10).

AVAILABLE ACCESSORIES

(See pages 12 & 13)

Type CC-302 Carrying Case.

General Purpose Oscilloscopes

The LBO-310A is a compact, general purpose instrument designed to provide long, reliable service in production test, repair, and educational applications. Its simple front panel with a minimum of controls makes it ideal for use by production personnel, students, and non-technical operators. Its low cost opens up many applications where waveform monitoring might otherwise be economically prohibitive. Sensitivity is 20 mV/division. Sweep frequencies range from 10 Hz to 100 kHz.

SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB, 4 div)
dc: 0 to 4 MHz.
ac: 2 Hz to 4 MHz.

Input Sensitivity Control
x100, x10, x1 and variable (20 mV max.)

Input Impedance
1 MΩ, 40 pF.

Maximum Input
600 V (dc plus ac peak).

Direct CRT Connection
10 V p-p sensitivity up to 100 MHz.

EXTERNAL HORIZONTAL DEFLECTION

Bandwidth (-3 dB, 10 div).
dc to 250 kHz.

Input Sensitivity
300 mV/div.

Maximum Input
30 V (dc plus ac peak).

INTERNAL HORIZONTAL DEFLECTION (Sweep Mode)

Type Sweep
Recurrent.

Sweep Rates
10 Hz to 100 kHz four ranges.

Synchronization
Source: Negative peak of input signal.
Sensitivity: 1 div.

Z-AXIS (INTENSITY) MODULATION

Sensitivity
20 V p-p.

CRT DISPLAY

Area
6 x 8 div, 1 div = 6 mm.

Accelerating Potential
1200 V.

Phosphor
P 31.

POWER REQUIREMENTS

100, 115, or 230 Vac, 50 to 60 Hz, 12 VA
(normally supplied wired for 115 Vac).

PHYSICAL

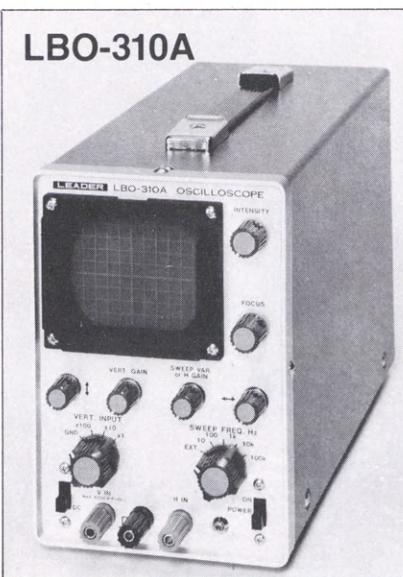
Size (W x H x D)
5 x 7½ x 12 in.
125 x 180 x 300 mm.

Weight
9.9 lbs., 4.5 kg.

ACCESSORIES SUPPLIED

Instruction Manual.
Three (3) test Leads.

4-MHz, 3-inch



10-MHz, 5-inch



The LBO-511 is an economical, general-purpose oscilloscope. Ideal for basic electronics courses, it is also widely used in industry and for TV servicing. Features include: a 9-step calibrated vertical input, 10 Hz to 100 KHz sweep frequencies (plus TV-H and TV-V), 2-axis, internal calibration signal, and inputs for color TV vector display.

SPECIFICATIONS

VERTICAL DEFLECTION

Bandwidth (-3 dB)
dc: 0 to 10 MHz.
ac: 2 Hz to 10 MHz.

Rise Time

35 nsec.

Input Impedance

1 MΩ, 40 pF.

Maximum Input

600 V (dc plus ac peak).

EXTERNAL HORIZONTAL DEFLECTION (X-Y MODE)

Bandwidth (-3 dB)
dc to 250 kHz.

Sensitivity

300 mV/cm.

INTERNAL HORIZONTAL DEFLECTION (SWEEP MODE)

Type Sweep

Recurrent.

Sweep Rate

Int: 10 Hz to 100 kHz in 4 ranges.
TV line: 15.75 kHz/2 for TV-H display.
Line: Line frequency with 0-140° phase adjustment.

Synchronization

Sources: Internal positive and negative slope, external and line frequency.
Sensitivity: 1 cm internal, 1 V pp external.

VECTORSCOPE OPERATION

Input Terminals

R-Y and B-Y signals on rear panel.

Z-AXIS (INTENSITY) MODULATION

Sensitivity
20 V p-p.

CRT DISPLAY

Area
8 x 10 cm.

Accelerating Voltage
1500 V.

Phosphor
P 31.

POWER REQUIREMENTS

100, 115, 200, 215, 230 Vac,
50 to 60 Hz, 16 VA
(normally supplied wired for 115 Vac).

PHYSICAL

Size (W x H x D)
9 ¾ x 7 ½ x 16 ¾ in.
250 x 180 x 415 mm.

Weight

15.5 lbs., 7 kg.

ACCESSORIES SUPPLIED

Instruction Manual.
LP-16AY Probe (Switchable x1/x10).
Three (3) Test leads.

Production Test Oscilloscope System

LBO-5810



The LBO-5800 Production Test Oscilloscope System has been designed to permit non-technical personnel to perform fast, accurate waveform testing in a production test environment. The system can be programmed for up to 32 independent tests. All oscilloscope controls and the selection of test points may be independently preset for each test.

In a typical application, the production engineer/technician programs each test using conventional oscilloscope controls on a programming unit. After setting the controls for a particular test, he presses a "write" button to transfer the settings to the memory in the operator's control unit. This programming is easily accomplished by anyone capable of operating a conventional oscilloscope.

In operation, the production worker simply connects up to 8 probes or a test fixture to the unit under test and selects the desired test number. The oscilloscope display is then observed and if correct, the next test number is selected. Since the LBO-5810 is a dual trace oscilloscope, one trace can be used to display waveforms from a known good unit and the operator simply compares the two waveforms.

The system consists of four components:

The LBO-5810 Programmable Oscilloscope

is a 20-MHz, dual trace oscilloscope which is controlled by TTL logic levels applied to rear panel connectors. Another version, the **LBO-5810P** contains front panel LED lamps which indicate the control positions selected.

The LPC-5811 Memory/Control Unit contains the CMOS Memory and operator control buttons for selecting up to 32 tests.

THE LPC-5813 Input Selector

provides for connecting, under program control, either of 4 test signals to each of the oscilloscope's two input channels.

The LPC-5812 Programmer is used only during initial setup of the production test station. It contains a set of conventional oscilloscope controls and a "write" button which transfers control settings to the LPC-5811 Memory/Control Unit.

SPECIFICATIONS

LBO-5810 20-MHz PROGRAMMABLE OSCILLOSCOPE

CONTROL SIGNALS

0-5 V TTL levels applied to two 50-pin connectors.

VERTICAL FUNCTIONS

Calibrated Attenuator Positions

5, 10, 20 and 50 mV/Div, 0.1, 0.2, 0.5, 1, and 2 V/Div.

Accuracy

± 3%.

Variable

Selection of either of five preset values or one manually adjustable value.

Input Impedance

1 MΩ, shunted by 35 pF.

Coupling

ac, gnd, or dc.

Maximum Input Voltage

600 V (dc plus ac p-p).

Trace Position

Five preset values or one manually adjustable value.

Display Modes

CH-1, CH-2, chop, alternate, add, subtract (CH-2 invert), and X-Y.

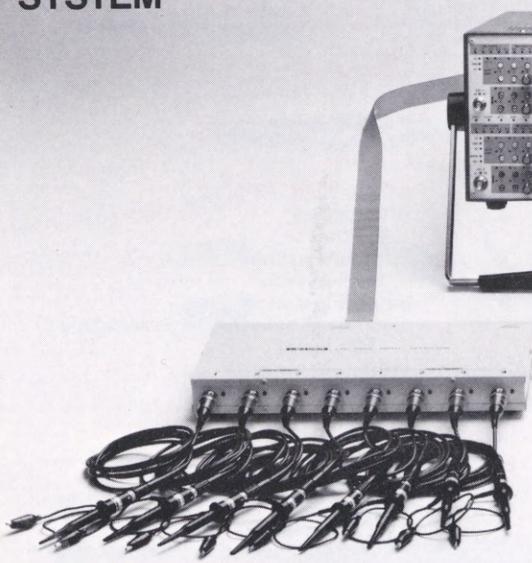
CH-2 Polarity

Normal/Invert.

Input Connectors

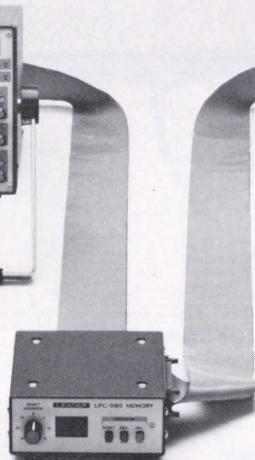
BNC.

LBO-5800 SYSTEM

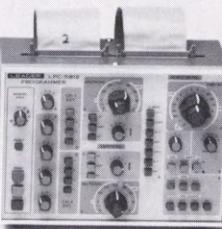


LPC-5813

LBO-5810P



LPC-5811



LPC-5812

HORIZONTAL FUNCTIONS

Calibrated Sweep Speeds

200, 100, 50, 20, 10, 5, 2, 1,
0.5 ms/div. and μ s/div (18 steps).

Accuracy

$\pm 5\%$.

Variable Sweep Speed

Five preset values and one manually
adjustable value.

External Bandwidth (via CH-2)

800 kHz (-3 dB, 10 cm).

X-Y Phase Difference

Less than 3% at 100 kHz.

Trace Position

Two preset values and one manually
adjustable value.

Magnification

X 1 or X 5.

TRIGGER FUNCTIONS

Sweep Mode

Normal or Auto.

Level

Five preset values and one
manually adjustable value.

Slope

+ or -.

Filter

Normal, TV-H, TV-V.

Source

CH-1, Alt, CH-2, Ext.

CRT DISPLAY

Tube Type

5" dia.

Phosphor

P 31 (P7 optional)

Effective Display Area

8 x 10 cm.

CALIBRATOR

Waveform

Square wave (1 kHz).

Voltage

0.5 V p-p, $\pm 3\%$

LBO-5810P PROGRAMMABLE OSCILLOSCOPE

(Specifications identical to the LBO-5810
except that LED's indicate the selected
values of programmed controls.)

LPC-5811 PROGRAM CONTROL UNIT

Capacity

32 independent tests, each including all
control settings and probe selections.

Write Mode

Via LPC-5812 Programmer & LBO-
5810P Programmable Oscilloscope.

Display

Displays selected test number.
(0 to 31).

Reset Button

Resets test number to "0".

DEC Button

Decreases test number by one.

INC Button

Increases test number by one.

Reset Rotary Switch

Determines the test number at which the
unit will automatically reset to starting test.

Memory

CMOS memory protected by floating
battery supply.

Battery

Ni-Cad Battery provides for one month
protection. Battery is automatically
charged when external power is applied.

LPC-5812 PROGRAMMER

Outputs

0-5 V TTL Levels, positive logic.

Write Mode

Provides for transferring the control
settings to the memory address (test
number) indicated on the LPC-5811.

Remote Control Mode

Provides manual remote control of all
functions of the LBO-5810 or LBO-5810P.

Edit Mode

Provides for transferring only one of eight
control area settings to the test number
indicated on the LPC-5811.

LPC-5813 MULTI-PROBE CONTROLLER

Outputs Channels

2.

Input Probe Positions

8 (4 per output channel).

Control

TTL Levels.

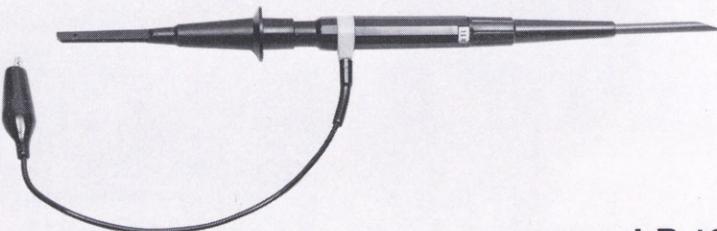
Input Impedance

1 M Ω , 35 pF.

Output Impedance

50 Ω , nominal.

Oscilloscope Accessories



LP-16AX

Direct/Low Capacitance Probe

SPECIFICATIONS

LP-16AX

AT X10 POSITION

Attenuation

$1/10 \pm 2\%$

Frequency range

dc-40 MHz.

Input resistance

$10 \text{ M}\Omega$ (Connected to oscilloscope of $1 \text{ M}\Omega$ input).

Maximum input

250 VRMS or 600 Vdc.

Compensation range

20 to 40 pF.

AT X1 POSITION

Frequency range

DC-5 MHz.

Input resistance

$1 \text{ M}\Omega$ (Connected to oscilloscope of $1 \text{ M}\Omega$ input).

Input capacity

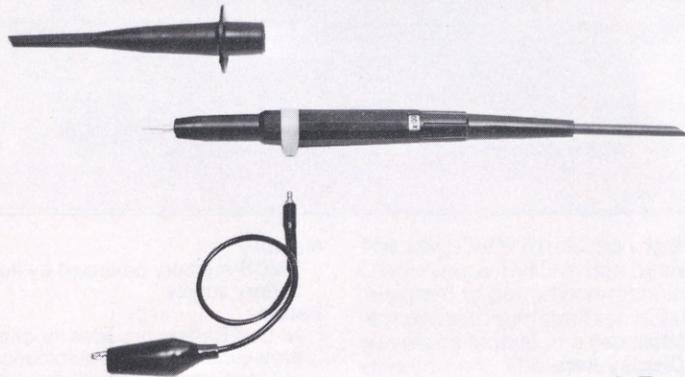
Less than 250 pF (Connected to oscilloscope of less than 50 pF).

Maximum input

250 VRMS or 600 Vdc.

Connector

BNC.



LP-17AX

High Impedance Probe (x10/x100)

SPECIFICATIONS

LP-17AX

X10 POSITION

Attenuation

$1/10 \pm 2\%$.

Frequency Range

dc-40 MHz.

Input Resistance

$10 \text{ M}\Omega$.

Input Capacitance

Less than 25 pF.

Compensation Range

20-40 pF.

Max. Input

600 Vdc.

Connector

BNC.

X100 POSITION

Attenuation

$1/100 \pm 3\%$.

Frequency Range

dc-20 MHz.

Input Resistance

$100 \text{ M}\Omega$.

Input Capacitance

Less than 8 pF.

Compensation Range

20-40 pF.

Max. Input

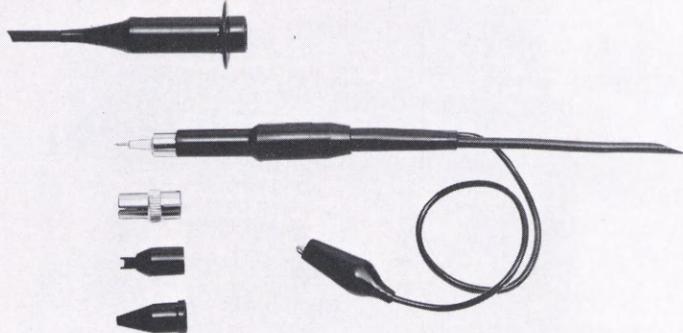
1500 Vdc.



LP-2054

Battery Pack

Type LP-2054 mounts internally in LBO-308S oscilloscope to provide a minimum of two hours operation. Unit recharges whenever oscilloscope is connected to ac power; cannot be overcharged. Ni-cad battery pack is easily installed by user.



LP-18AX

100 MHz, x10 Probe

SPECIFICATIONS

LP-18AX

Bandwidth

100 MHz.

Rise Time

3.5 ns.

Input Resistance

10 MΩ when used with oscilloscopes with 1 MΩ input (Probe resistance 9 MΩ ± 1%).

Compensation Range

10-60 pF.

Working Voltage

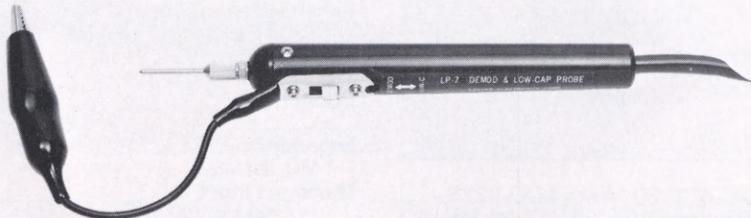
600 Volts dc (including Peak ac).

Cable Length

1.5 Meters.

Includes

Insulating tip, spring hook, trimmer tool, BNC adaptor, I.C. tip.



LP-7X



Front-Panel Covers

Type LC-2001 for oscilloscope models LBO-507A, 508A, 513, 514 and 520.

Type LC-2002 for oscilloscope model LBO-515B.

Type LC-2003 for oscilloscope model LBO-308S.



Probe Pouches

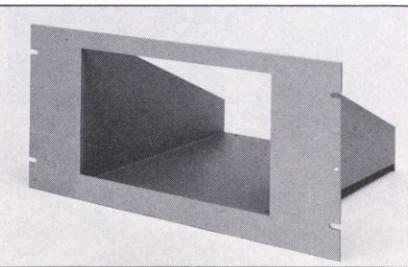
Type LP-2004 for oscilloscope models LBO-507A, 508A, 513 and 514.

Type LP-2005 for oscilloscope model LBO-515B.

Type LP-2003 for oscilloscope model LBO-520.

Demodulator & Low Capacitance Probe

The LP-7X demodulator and low capacitance probe is a 10:1 switchable, dual-purpose probe designed for maximum utility. Includes an RF detection circuit and a low-capacitance 10:1 multiplier. Useful for checking sweep oscillator outputs, IF response, etc. BNC connector.



Carrying Cases

Type CC-302 for oscilloscope model LBO-302.

Type LC-2215 for oscilloscope model LBO-308S.

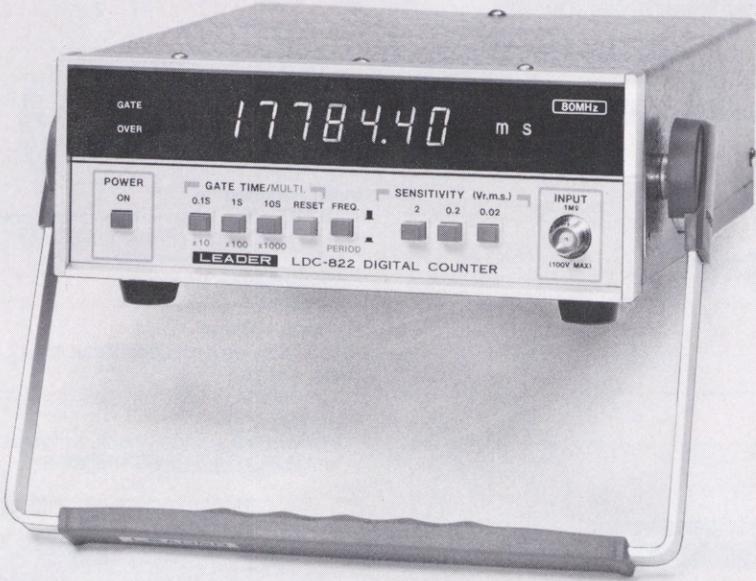
Rack-mount Adaptors

Type LRA-508 for oscilloscope models LBO-507A, 508A, 513, 514, and 520.

Type LRA-515 for oscilloscope model LBO-515B.

80, 250, and 520-MHz Frequency Counters

LDC-822
80 MHz



The LDC-822 (80 MHz), LDC-823S (250 MHz) and LDC-824S (520 MHz) provide accurate, reliable, frequency and period measurements for a wide variety of electronic and communications testing.

Large fluorescent displays make these units particularly well suited to production testing and other applications where a large, bright readout is essential.

All three units are housed in well shielded metal cases which virtually eliminate radiation problems and errors from nearby RF fields.

The LDC-822 provides 20-mV sensitivity up to 80 MHz and 5 ppm stability from 0 to 40°C. The LDC-823S and LDC-824S offer 20 mV sensitivity up to 100 MHz and 50 mV above 100 MHz. Temperature stability of 1 ppm is provided by a TCXO time base in the 250 MHz and 520 MHz models (an ovenized time base with 0.03 ppm stability is available as an option).

SPECIFICATIONS

LDC-822

FREQUENCY MEASUREMENTS

Range

10 Hz-80 MHz.

Gate Time

0.1, 1, 10 s.

Resolution

10, 1, 0.1 Hz.

Accuracy

± 1 count,
± time base accuracy.

PERIOD MEASUREMENT

Range (X1)

100 ms to 1 μ s.

Multiplication Factors

Times 10, 100 and 1,000.

Resolution

10, 1, 0.1 ns.

Accuracy

± 1 count,
± time base accuracy,
± trigger error \div mult. factor.

INPUT SECTION

Sensitivity

20 mVrms.

Attenuator

Times 1, 10, and 100.

Coupling

ac.

Impedance

1 MQ nominal.

Maximum Input

10 to 400 Hz; 100 Vrms.
400 Hz to 100 kHz; 20 Vrms.
100 kHz to 80 MHz; 5 Vrms.

TIME BASE

Frequency

10 MHz.

Temp. Stability (0–40°C)

5 ppm.

Aging Rate

1 ppm/yr.

GENERAL

Display

7 digits, 0.5" Fluorescent.

Operating Temperature

0–40°C (32–104°F).

Power

110/220 Vac, ± 10%
50/60 Hz; 10VA.

PHYSICAL

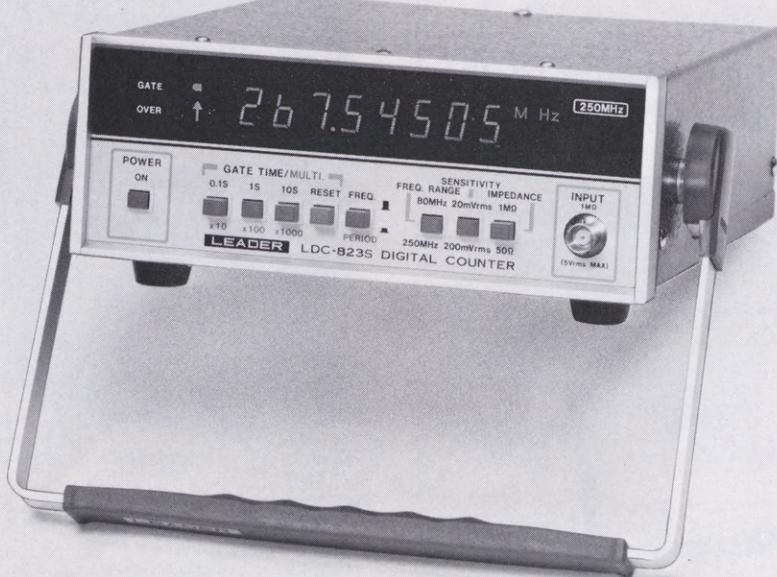
Size (W x H x D)

8 x 3 x 10 in.
203 x 76 x 254 mm.

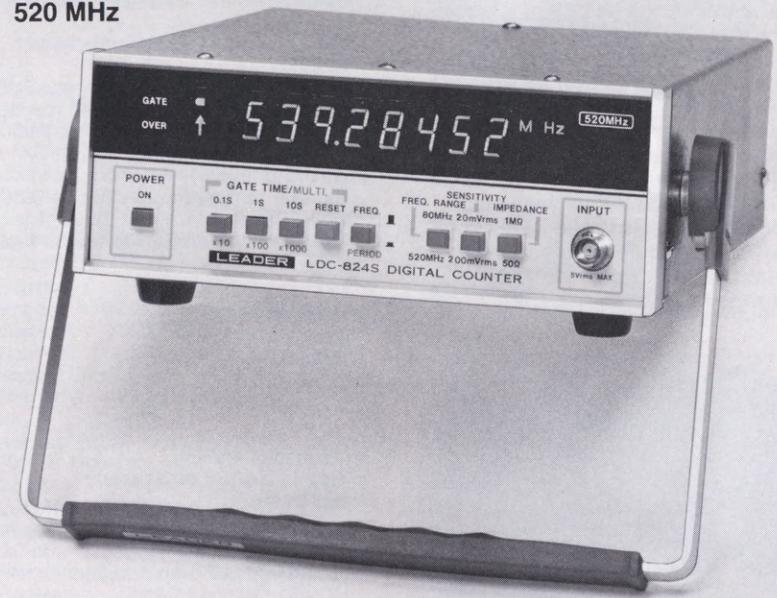
Weight

5 lbs, 2.3 kg.

LDC-823S 250 MHz



LDC-824S 520 MHz



LDC-823S and LDC-824S FREQUENCY MEASUREMENTS

Range

LDC-823S: 10 Hz-250 MHz.
LDC-824S: 10 Hz-520 MHz.

Gate Time

0.1, 1, 10 s.

Direct Resolution (up to 80 MHz)

10, 1, 0.1 Hz.

Prescaled Resolution

100, 10, 1 Hz.

Accuracy

± 1 count,
± time base accuracy.

PERIOD MEASUREMENT

Range

100 ms to 1 μ s.

Multiplication Factors

Times 10, 100 and 1,000.

Resolution

10, 1, 0.1 ns.

Accuracy

± 1 count,
± time base accuracy,
± trigger error \div mult. factor.

INPUT SECTION

Sensitivity

20 mV (50 mV above 100 MHz)

Attenuator

Times 1 and 10.

Coupling

ac.

Impedance

1 M Ω or 50 Ω switchable.

Maximum Input

10 to 400 Hz; 100 Vrms.
400 Hz to 100 kHz; 20 Vrms.
100 kHz to 520 MHz; 5 Vrms.

TIME BASE

Frequency

10 MHz.

Temp. Stability (0–40°C)

1 ppm (0.03 ppm optional*)

Aging Rate

1 ppm/yr.

Output

1 Vp-p, 10 MHz.

External Input

1 to 10 Vp-p.

GENERAL

Display

8 digits, 0.5" Fluorescent.

Operating Temperature

0–40°C (32–104°F).

Power

110/220 Vac, ± 10%
50/60 Hz; 10 VA.

PHYSICAL

Size (W x H x D)

8 x 3 x 10 in.
203 x 76 x 254 mm.

Weight

6 lbs, 2.6 kg.

*LDC-823S-01 and LDC-824S-01 available with optional ovenized time base with 0.03 ppm stability (0–40°C)

3½ Digit Multimeter with Semi-Automatic Ranging



LDM-851



Compact, rugged, and accurate... the LDM-851 is uniquely suited for both lab and field work with either ac or battery power. Operation is easy and straightforward. Semi-automatic ranging with high and low-range selection is used on four Vdc, Vac, and KΩ measurement ranges. Automatic ranging with single-button selection is used for the two MΩ and dc mA measurement ranges. Full-range measurements are: 0.001 to 1,000 volts (dc and ac rms), 1 Ω to 1,999 KΩ, 0.001 to 19.99 MΩ. Other features include large easy-to-read LED display, high overload protection, automatic polarity selection and over-range indication.



CC-851 Carrying Case

SPECIFICATIONS

DC Voltage

LOW Range: 0.001 to 19.99 V.
HIGH Range: 000.1 to 1,000 V.
Accuracy: $\pm 0.5\%$ reading, $\pm 0.5\%$ full scale, ± 1 digit.
Input Impedance: 10 MΩ.
Overload Protection: 1,200 Vdc/Vac (1 min).

AC Voltage

LOW Range: 0.001 to 19.99 V.
HIGH Range: 000.1 to 1,000 V.
Accuracy: $\pm 1\%$ reading, $\pm 0.8\%$ full scale, ± 1 digit.
Input Impedance: 11 MΩ.
Overload Protection: 1,200 Vac, 500 Vdc (1 min).

Resistance

LOW Range: 0.001 to 19.99 KΩ (100 μ A).
HIGH Range: 000.1 to 1,999 KΩ (1 μ A).
Accuracy: $\pm 0.5\%$ reading, $\pm 0.5\%$ full scale, ± 1 digit.
MΩ Range: 0.001 to 19.99 MΩ.
Accuracy: $\pm 1.5\%$ reading, $\pm 0.5\%$ full scale, ± 1 digit.
Overload Protection: 500 Vdc, 250 Vac (1 min).

DC Current

DCA Range: 0.01 mA to 199.9 mA (2 sub-ranges).
Accuracy: $\pm 1.0\%$ reading, $\pm 0.8\%$ full scale, ± 1 digit.
Overload Protection: 0.3 A fuse.

Display

Type: 7/16 in, 7 segment LED, 1,999 max.
Polarity: — indicates reverse polarity.
Over Range: Flashing digits.
Low Battery: Flashing decimal point.
Response Time: dc and Ohms, 1 sec; ac 3 sec.
Sample Rate: 2 measurements per second.

Power Requirements

Battery: Four (4) "C" cells (18 hours).
ac (with adapter supplied): 117 Vac, 50-60 Hz, 2 VA.

Environmental

Storage Temperature: -20 to +60°C.
Operating Temperature: 0-40°C.
Max Continuous Humidity: 85% relative humidity.

PHYSICAL

Size (W x H x D)

6 1/8 x 2 1/4 x 4 7/8 in.
160 x 58 x 122 mm.

Weight

1.5 lbs, 0.7 Kg.

SUPPLIED ACCESSORIES

Instruction Manual.
Type LPS-166F ac adapter.
Test lead set.

AVAILABLE ACCESSORIES

LP-6 High Voltage Probe.
LC-19 AC Clamp-on Adapter.
CC-851 Carrying Case.

20,000 Ω /V Multimeter



The LT-70B is a versatile, general purpose instrument for lab or field. It measures: dc voltage from 25 mV to 1,000 V; dc current from 5 μ A to 50 mA; resistance from 1 Ω to 50 M Ω ; ac from 250 mV to 250 V and from 0.25 to 2.5 A. Two dB scales measure audio power levels in 600- Ω systems. Diode testing is facilitated by load current scales. Protected against overloads and polarity reversals.

SPECIFICATIONS

DC Voltage

Ranges: 0-0.25, 1, 5, 25, 50, 250, 1,000 Vdc.
Sensitivity: 20,000 Ω /Volt.
Accuracy: \pm 3% full scale.

AC Voltage

Range: 0-2.5, 10.50, 250 Vrms.
Sensitivity: 8,000 Ω /Volt.
Accuracy: \pm 4% full scale.

DC Current

Ranges: 0-50 μ A, 2.5 mA, 50 mA.
Accuracy: \pm 3% full scale.

AC Current

Ranges: 0-2.5 A.
Accuracy: \pm 4% full scale.

Ohms

Ranges: 0 to 20 Ω , 200 Ω , 2 K Ω , 20 K Ω , 200 K Ω midscale.
Accuracy: \pm 4% of arc length.

dB Levels

Ranges: -20 to +10 dB and +10 to +22 dB.
Reference: 0 dB = 0.775 V, 600 Ω , 1 mW.

Diode Test

Ranges: 0-75 μ A, 750 μ A, 75 mA, 750 mA.

Power Requirements

Two (2) "AA" Cells and one (1) 9V transistor cell.

PHYSICAL

Size (W x H x D)

4 $\frac{1}{4}$ x 6 x 2 in.
107 x 152 x 53 mm.

Weight

1.2 lbs, 0.55 kg.

SUPPLIED ACCESSORIES

Instruction Manual.
Two (2) Test Leads.
Two (2) Alligator Clip Adapters.

FET Lab Multimeter



The LEM-73A is a sensitive, versatile electronic multimeter for general purpose laboratory applications. Its high input resistance permits measuring high impedance circuits with minimum loading. Dc and ac voltages can be measured from 30 mV to 1,000 V; dc and ac currents from 30 μ A to 300 mA. Resistance, using either high (1.5 V) or low (100 mV) test voltages may be measured from 0.2 Ω to 500 M Ω . DB scales are also provided for sound level measurements in 600 Ω audio systems. Ac operated.

SPECIFICATIONS

DC Voltage

Ranges: 0-0.3, 1, 3, 10, 30, 100, 300, 1,000 Vdc.
Accuracy: \pm 3% full scale.
Input Resistance: 10 M Ω .

AC Voltage

Ranges: 0-0.3, 1, 3, 10, 30, 100, 300, 1,000 Vac.
Accuracy: \pm 4% full scale.
Input Resistance: 10 M Ω .
Frequency Range: 0.3 V ranges, 25 Hz to 1 MHz, \pm 0.5 dB; to 1,000 V ranges, 25 Hz to 3 MHz, \pm 1 dB.
dB Calibration: -15 to +2 dBm, 0 dB = 1 mw/600 ohms.

DC Current

Ranges: 0.03, 0.1, 0.3, 1, 3, 10, 30, 100, 300 mA.
Accuracy: \pm 3% full scale.
Insertion loss: 0.3 V at full scale.

AC Current

Ranges: 0.03, 0.1, 0.3, 1, 3, 10, 30, 100, 300 mA.
Accuracy: \pm 4% full scale.
Insertion loss: 0.3 V at full scale.
Frequency range: 40 to 400 Hz.

Resistance

Ranges: 0 to 10 Ω , 100 Ω , 1 K Ω , 10 K Ω , 1 M Ω , 10 M Ω midscale.
Test Voltage: 100 mV or 1.5 V selectable.
Accuracy: \pm 3% of arc length.

POWER REQUIREMENTS

ac: 100, 117, 200, 217, 234 Vac \pm 10%
50 to 60 Hz (normally supplied for 117 Vac).
Battery: One (1) "C" cell (not supplied).

PHYSICAL

Size (W x H x D)

5 $\frac{7}{8}$ x 6 $\frac{1}{8}$ x 2 in.
150 x 175 x 125 mm.

Weight

1.5 lbs, 0.7 kg.

ACCESSORIES SUPPLIED

Instruction Manual.
One (1) LP-13 Test Probe.

High-Voltage Meter/Probe

LHM-80A



The LHM-80A permits easy and safe measurement of voltages up to 40,000 Vdc. It is widely used for checking CRT accelerating voltages, testing and servicing X-ray machines, and other high voltage equipment. Completely self-contained (no batteries or external power required), it is made of high-impact polystyrene with a special corona safety shield. Full-scale accuracy is \pm 3%. It is supplied with ground wire and heavy-duty cap.

SPECIFICATIONS

Range

0 to 40 kV.

Accuracy

\pm 3% full scale.

Input Impedance

20,000 Ohms/Volt.

Multiplier Resistance

800 M Ω .

Material

High impact polystyrene.

Length

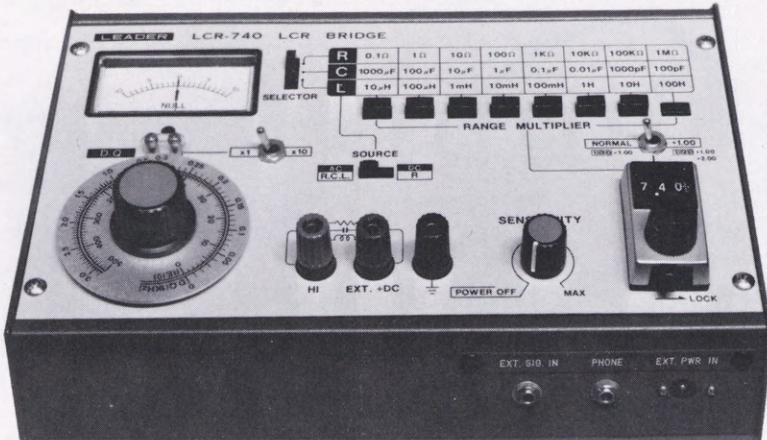
14 in, 356 mm.

Weight

1 lb, 0.45 kg.

Terminating RF Power Meter

LCR-740 LCR Bridge



LCR-740

The LCR-740 is a versatile instrument for accurately measuring inductance, capacitance, resistance, and loss factor of electronic components. This compact unit provides a basic accuracy of 0.5% and resolutions of 0.1 μ H, 1 pF or 0.001 Ω . Its broad measurement ranges make it ideal for use in component design, inspection and selection. It has also found wide use in educational institutions as an aid to teaching the characteristics of inductive, capacitive and resistive components.

SPECIFICATIONS

INDUCTANCE MEASUREMENTS

Range

0.1 μ H to 1,100 H in 8 ranges with 10% overlap between ranges.

Resolution

0.1 μ H.

Accuracy (15 to 25°C)

100 μ H to 10 H: \pm 0.5% reading, \pm 0.1% full scale.
10 H to 100 H: \pm 1% reading, \pm 0.1% full scale.
0.1 μ H to 10 μ H: \pm 3% reading, \pm 0.1% full scale.

Residual Inductance

0.3 μ H max.

CAPACITANCE MEASUREMENTS

Range

1 pF to 11,000 μ F in 8 ranges with 10% overlap between ranges.

Resolution

1 pF.

Accuracy (15 to 25°C)

100 pF to 100 μ F: \pm 0.5% reading, \pm 0.1% full scale.
10 pF to 100 pF: \pm 1% reading, \pm 0.1% full scale.
100 μ F to 1,000 μ F: \pm 3% reading, \pm 0.1% full scale.

Residual Capacitance

3 pF max.

DISSIPATION (D) AND QUALITY (Q) FACTOR MEASUREMENTS

Range

0.01 to 30 at 1 kHz in 2 ranges.

Accuracy

\pm 10% \pm 3 scale divisions.

RESISTANCE MEASUREMENTS

Range

0.001 Ω to 11 M Ω in 8 ranges with 10% overlap between ranges

Resolution

0.001 Ω .

Accuracy 15 to 25°C

0.1 Ω to 100 k Ω : \pm 0.5% reading, \pm 0.1% full scale.
100 k Ω to 1 M Ω : \pm 1% reading, \pm 0.1% full scale.
0.001 to 0.1 Ω : \pm 2% reading, \pm 0.1% full scale.

Residual Resistance

0.003 Ω max.

MEASUREMENT SIGNAL SOURCES

dc

Internal or external for resistance measurements.

ac

Internal 1 kHz or external 50 Hz to 40 kHz for inductance and capacitance measurements.

POWER REQUIREMENTS

Internal 9 V battery (supplied).
Ac Adapter (optional).

PHYSICAL

Size (W x H x D)

9 1/2 x 3 3/8 x 6 5/8 in.
240 x 85 x 170 mm.

Weight

4.5 lbs, 2kg.

Accessories Supplied

Instruction Manual.
Cable for external input.
Miniature earphone (for null detecting).
9 V transistor battery.

Accessories Available

Type LPS-169A ac Adapter.



LPM-880S

The LPM-880S provides accurate power measurements of transmitters with 50-ohm outputs. Connected as a dummy load, it is widely used in production-line testing and servicing of mobile, marine VHF-FM radiotelephones, VHF and UHF aircraft transceivers... virtually all types of fixed and mobile transceivers up to 500 MHz. Push-button ranges of 5, 20, and 120 watts are provided. Full-scale accuracy is \pm 10%.

SPECIFICATIONS

Frequency Range

1.8-500 MHz.

Load Impedance

50 Ω .

VSWR

1.15:1 max.

Power Range

0 to 5, 20, and 120 W full scale (continuous up to 80 W, max., 1 min above 80 W).

Accuracy

\pm 10% full scale.

Input Connector

Type M (UHF).

Size (W x H x D)

4.7 x 5 x 9 in.
112 x 150 x 230 mm.

Weight

4 lbs., 1.8 kg.

Accessories Supplied

Instruction Manual.

Automatic Transistor Checker



LTC-906

The LTC-906 is a portable, multi-purpose transistor checker widely used in laboratories, schools, servicing, and for production trouble-shooting. In the automatic mode, activating a single switch initiates a programmed test that automatically identifies emitter, base, collector, and type of device (NPN, PNP, FET, diode, or other) with an audible and visual good-or-bad indication... both in-and out-of-circuit. In the dc parameter mode, out-of-circuit measurements can be made of leakage current, h_{fe} , V_{be} and V_d . Powered by a single 9 V battery, it easily fits in a technician's tool kit.

SPECIFICATIONS

AUTOMATIC MODE

Test Voltage

± 2 V, 10% duty cycle.

Test Current

Low Drive: 4.5 mA.
High Drive: 60 mA.

Current Limiting Resistance

Low Drive: 470 Ω .
High Drive: 33 Ω .

Scanning Rate

0.1 s per test, complete scan is 1 s.

Devices Tested

Transistors (low/medium power), FETs, UJT, SCR, Diodes.

Tests Performed (In or Out of Circuit)

Good bad.
PNP/PNP or diode polarity.
Lead identification (E, B, C).

Indicators

LEDs for all tests.
Audible tone for good bad test
(may be silenced).

DC PARAMETER MODE (OUT OF CIRCUIT ONLY)

Leakage Current/I_{CEO}

Ranges: 0 to 100, 1,000 and 10,000 μ A full scale.
Accuracy: $\pm 6\%$.

V_{BE}/V_D

Range: 0 to 3 V full scale.
Accuracy: $\pm 6\%$.
Test Current: 2 mA.

h_{FE}

Ranges: 0 to 100, 1,000, 10,000.
Base Current: 1 μ A.
Collector Current: 30 mA max.
Test Voltage: ± 5 V max.

POWER REQUIREMENTS

Internal: 9 V transistor battery (supplied).
External dc: 8 to 10 Vdc, 25 mA.
External ac: 117 Vac (requires optional LPS-169A adapter).

PHYSICAL

Size (W x H x D)

4 $\frac{1}{4}$ x 6 x 2 $\frac{1}{8}$ in.
108 x 152 x 540 mm.

Weight

1 lb, 0.45 kg.

ACCESSORIES SUPPLIED

Instruction Manual.
Test Cable with 3 Alligator Clips.

ACCESSORIES AVAILABLE

LP-11Y Three Point Probe
for in-circuit testing.
LPS-169A ac Adapter.



**LP-11Y
OPTIONAL**

The LP-11Y Three-Point Probe permits convenient, one-handed connection to transistors installed on printed circuit boards. The probe is equipped with three flexible, spring loaded, pointed tips which are easily manipulated for simultaneous connection to transistor leads.

Semiconductor Curve Tracer



LTC-905



LP-11
OPTIONAL

The LP-11 Three-Point Probe permits convenient, one-handed connection to transistors installed on printed circuit boards. The probe is equipped with three flexible, spring loaded, pointed tips which are easily manipulated for simultaneous connection to transistor leads.

The LTC-905 permits displaying the characteristic curves of all types of semiconductors (NPN, PNP, triacs, SCR's, FET's, MOSFET's, zener, signal, and rectifier diodes, etc.) on virtually any oscilloscope. Used in labs, classrooms, and for production-line testing, the LTC-905 will measure (both in-and out-of-circuit) gain (beta), cutoff, leakage, and output admittance. The LTC-905 provides 8 selectable collector sweep voltages from 10 to 100 Volts along with a full set of step-generator currents and voltages.

SPECIFICATIONS

COLLECTOR/SWEEP

Sweep Frequency

120 Hz.

Sweep Waveform

Full wave rectified waveform.

Sweep Voltages

10, 20, 30, 40, 50, 60, 80, and 100 V selectable in 8 steps, $\pm 10\%$.

Current

100 mA maximum.

Step Polarity

+ or -.

Dissipation Limiting Resistor

Small-signal devices - 1,000 Ω . Power devices - 100 Ω .

STEP GENERATOR

Current Ranges

10, 20, 50 μ A and 0.1, 0.2, 0.5, 1, 2 mA per step, $\pm 5\%$.

Voltage Ranges

0.1, 0.2, 0.5 V per step. $\pm 5\%$.

Number of steps

7.

Ext. Bias

Write one curve, using external bias supply.

H. Length

Horizontal gain control for oscilloscope.

SOCKETS

Two T0-5 type transistor sockets, each pin paralleled by cables and special in-circuit probe.

Output Terminals

Vertical, horizontal, external bias and ground connectors.

POWER REQUIREMENTS

115 Vac, 50/60 Hz.

PHYSICAL

Size (W x H x D)

9 $\frac{3}{8}$ x 3 $\frac{1}{2}$ x 6 $\frac{1}{4}$ in.
240 x 89 x 160 mm.

Weight

7 lbs, 3.2 kg.

ACCESSORIES SUPPLIED

Instruction manual.

Two test cables.

Three oscilloscope cables with alligator clips.

ACCESSORIES AVAILABLE

LP-11 Three Point Probe for in-circuit testing.

NTSC Video Generator



The LCG-400 provides both gen-lock and internal synchronization with the full range of video signals needed for testing and adjusting monitors, cameras, VTR's and overall performances of color and B&W TV systems. It is available with either multiburst (LCG-400M) or sweep-marker (LCG-400S) generators. The LCG-400 will sync with all standard composite video signals including those from quad head and helical scan VTR's. Patterns include EIA and full field color bars, 5-step stair case, 8 color rasters, cross hatch and dot convergence, circle and corner marker with on/off control of chroma and luminance. Both interlace and progressive scanning are provided. Outputs include composite video, subcarrier, black burst, vertical and horizontal drive, and CH 5/6 RF. Units are supplied for either bench-top or rack-mounting.

SPECIFICATIONS

SYSTEM

NTSC-M.

PATTERNS

EIA Color Bar

EIA standard RS-189A
75 % amplitude – 100 % saturated color bar with gray (75% white), yellow, cyan, green, magenta, red, blue – I, 100% white, "Q" and black.

Full Field Color Bar

75 % Amplitude – 100 % saturated color bar with gray (75% white), yellow, cyan, green, magenta, red, blue, and black.

Stair Case

5 step.

Raster

8 colors – red, green and blue (combined), white (100% and 75%), yellow, cyan, green, magenta, red, blue and black.

Window

White window on black background.

Convergence

Cross hatch 17 x 13; dot 16 x 12, and center.

Alignment

Cross hatch 9 x 7, circle, and corner marker.

Multiburst Frequency (LCG-400M only)

0.5, 1.5, 2.0, 3.0, 3.58, 4.2 MHz ($\pm 3\%$ adjustable) with 100% white reference level at left end of burst; 50 and 100% amplitude with ± 1 dB flatness.

Video Sweep (LCG-400S only)

50 kHz to 7 MHz synchronized with field; amplitude is 50 or 100% fixed or 0 to 100% variable with ± 1 dB flatness; 0.5, 1.0, 2.0, 3.5, 3.58, and 4.2 MHz marker frequencies.

SYNC SIGNAL

EIA Standard RS-170A.

Scanning System

Interlace and progressive.

No. of Scanning Line

Interlace 525 and progressive 262.

Line Frequency

15.734 KHz.

Field Frequency

Interlace 59.94 Hz and progressive 60.05 Hz.

Gen-Lock

Synchronized to video signal input.

Horizontal Delay

Continuously variable.

Sub-Carrier Phase

0–360° continuously variable.

SOUND

Intercarrier system F3 (FM).

Carrier Frequency

4.5 MHz.

Int. Mod

1 kHz sine wave.

1 kHz Output

3 V p-p.

Output Impedance

600 Ω .

EXT MOD

Frequency

50 Hz–10 KHz.

Input Voltage

3 V p-p.

Input Impedance

600 Ω .

Pre-Emphasis

No.

COMPOSITE VIDEO OUTPUT

Polarity

Negative Sync.

Voltage

1 V fixed and 0–IV Variable.

Impedance

75 Ω .

SUBCARRIER OUTPUT

Frequency

3.79545 MHz ± 5 Hz (0°–40°C).

Voltage

2 V p-p.

Impedance

75 Ω .

BLACK BURST OUTPUT

Voltage

Sync Signal 286 mV and burst 286 mV.

Impedance

75 Ω .

SCOPE TRIGGER OUTPUT

Mode

Vertical, horizontal or frame.

Voltage

1 V.

Impedance

75 Ω .

RF OUTPUT

Channel

CH-5, 77.25 MHz $\pm 0.5\%$.

CH-6, 83.25 MHz $\pm 0.5\%$.

POWER REQUIREMENTS

115/230 Vac, 50-60 Hz.

PHYSICAL

Size (W x H x D)

16 $\frac{3}{4}$ x 5 $\frac{1}{4}$ x 15 $\frac{3}{4}$ in.

426 x 132 x 400 mm.

Weight

16.5 lbs, 7.5 kg.

ACCESSORIES SUPPLIED

Cable, BNC-alligator clip.

Rack mount adaptor kit.

NTSC Video Pattern Generator



LCG-396

The LCG-396 is a versatile NTSC video generator suitable for testing, servicing and evaluating a broad range of video systems including video tape recorders, CATV and MATV systems, video monitors and television receivers. It provides 11 test patterns including the standard NTSC color bars for measuring and adjusting color purity, white balance, luminance, chrominance, and convergence. Outputs include composite video, H or V scope trigger, subcarrier and RF (CH5 or 6). Other features include variable chroma, luminance and set-up levels, and selectable interlaced or progressive scanning. The LCG-396 is supplied with a comprehensive user's manual including detailed VTR, TV and monitor application data.

SPECIFICATIONS

PATTERNS

NTSC Color Bars

Split field color bars with upper 75% white, yellow, cyan, green, magenta, red, blue and black; lower 25% Q, -I, and 100% white (IQW).

Full Field Color Bars

As above without IQW.

Rasters

Separate red, blue, green and white.

Stair Case

Obtained from color bars with chrominance component deleted.

Crosshatch

21 vertical x 16 horizontal white lines centered on black raster and one center dot.

Dots

20 vertical x 15 horizontal white dots equally spaced on black raster.

Rasters

Red, blue, green and white.

Center Cross

One vertical and one horizontal white line centered on black raster.

COMPOSITE VIDEO OUTPUT

Level

0 to 1.5 V p-p, 1 V p-p in preset position.

Impedance

75 Ω.

Polarity

Positive (Sync signal is negative).

RF OUTPUT

Frequencies

CH-5, 77.25 MHz ± 0.5%; CH-6, 83.25 MHz ± 0.5%.

Level

10 mVrms.

Impedance

75 Ω unbalanced.

Modulation System

Negative modulation.

SUBCARRIER OUTPUT

Frequency

3.579545 MHz ± 100 Hz (Calibration to ± 5 Hz is possible).

Level

1 Vpp (no load).

Impedance

75 Ω.

TRIGGER OUTPUT

Frequency

At either horizontal or vertical frequency.

Level

1 V p-p (no load).

Impedance

75 Ω.

SYNCHRONIZATION

Type

60 Hz field of 525 lines interlaced with equalizing pulse, switchable to progressive scanning.

Horizontal Scanning Frequency

15.734 Hz.

Vertical Scanning Frequency

Interlaced 59.94 Hz and progressive 60.05 Hz.

Horizontal Blanking Pulse Width

11.3 μs.

Vertical Blanking Pulse Width

Interlaced 1.24 ms and progressive: 1.21 ms.

Horizontal Sync

4.61 μs.

Front Porch

1.3 μs.

Burst

8 cycles min.

ENVIRONMENTAL

Operating Temperature

0-40°C.

POWER REQUIREMENTS

100, 117, 200, 234 Vac, 50-60 Hz, 20 VA (normally supplied wired for 117 Vac).

PHYSICAL

Size (W x H x D)

7 1/8 x 4 3/4 x 11 1/8 in.
200 x 120 x 300 mm.

Weight

7 lbs, 3.2 kg.

ACCESSORIES SUPPLIED

Instruction Manual

One (1) cable, BNC to alligator clips.

Video Color Generator/Analyzer



LCG-395A

The LCG-395A is designed for VTR/VCR, MATV, CCTV, and TV servicing. RF's, IF's, local oscillators; it permits testing all TV circuits quickly and efficiently. Invaluable for locating color shifts, internal ghosts and other troubles. Employing highly stable digital circuitry, the LCG-395A provides rainbow and gated rainbow color bars, noiseless white raster, window, 5-step staircase for modulation checks, and a total of 8 different dot and line convergence patterns. Variable amplitude RF (both 75 and 300 Ω) and video signal injection is provided.

SWITCH SETTINGS			PATTERNS AND APPLICATIONS			SWITCH SETTINGS			PATTERNS AND APPLICATIONS		
DOT	LINE	MARK	DOT	LINE	MARK	DOT	LINE	MARK	DOT	LINE	MARK
ON	ON	ON	Convergence.			ON	OFF	OFF	Dots (21x15):		
			For synchronization, deflection, and overall convergence checks.			OFF	ON	ON	For color killer checks.		
ON	ON	OFF	Dots (11x7), crosshatch (10x8):			OFF	OFF	ON	Crosshatch (21x15):		
			For raster linearity and convergence checks.						For dynamic convergence checks.		
ON	OFF	ON	Dots (11x7), zone markers:			ON			Zone Markers:		
			For checking static convergence; using center dot on raster.						For checking raster centering and overscanning conditions.		
						OFF	OFF	OFF	Black convergence:		
									For checking noise in RF circuits and H.V. regulation.		

SPECIFICATIONS

PATTERNS

Color

Simultaneous display of rainbow (top $\frac{1}{3}$), 10-bar gated rainbow (center $\frac{1}{3}$) and 3-bar gated rainbow (bottom $\frac{1}{3}$).

Raster

Noiseless white raster, 0-100% variable.

Stair case

5-step black to white (20% steps).

Window

White window on black raster.

Convergence

Separate Dot Line and Marker Controls generate a total of eight patterns.

SYNCHRONIZATION

Horizontal

15.75 kHz.

Vertical

60.11 kHz

COMPOSITE VIDEO OUTPUT

Level

-3 to +3 Vpp.

Impedance

75 Ω .

RF OUTPUT

Frequencies

77.25 MHz (CH-5) and 83.25 MHz (CH-6).

Level

1 to 10 mV variable.

Impedance

75 and 300 Ω .

IF OUTPUT

Frequency

45.75 MHz.

Level

1 to 10 mV variable.

Impedance

75 and 300 Ω .

TRIGGER OUTPUT

Synchronization

Horizontal, Vertical and Composite.

Level

3 V pp.

Impedance

10 k Ω

POWER REQUIREMENTS

100, 117, 200, 234 Vac \pm 10%, 50 to 60 Hz, 10 VA (normally supplied wired for 117 Vac.)

PHYSICAL

Size (W x H x D)

8 x 3 $\frac{1}{4}$ x 10 in.

203 x 83 x 254 mm.

Weight

2.6 lbs, 1.2 kg.

ACCESSORIES SUPPLIED

Instruction Manual

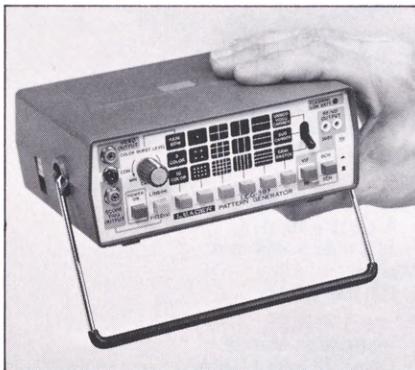
One (1) Output Cable.

Battery-Operated Color Generator/TV Analyzer



LCG-397

The LCG-397 is a very portable, comprehensive source of video signals for testing, trouble-shooting, and adjusting TV receivers and monitors. It provides 18 crystal controlled test patterns for virtually all necessary picture adjustments in color and monochrome units. Composite video, IF, and RF signal-injection outputs are provided. In addition, a separate trigger output simplifies obtaining stable oscilloscope displays at both line and field rates. A front panel control for adjusting the colorburst level permits rapid checking and adjustment of AFPC and color killer circuits. The LCG-397 is powered by four standard "C" cells (an ac adapter is optional) and is equally valuable to both the bench and outside technicians.



SPECIFICATIONS

PATTERNS

General

Color bar system uses an offset subcarrier at 3.563795 MHz, ± 20 Hz; Color burst level is continuously variable to 100%; Color bar level is fixed at 100%.

Color (3)

10-Color Bar (30° phase angle), 3 Color Bar [R-Y, B-Y, -(R-Y)] and rainbow.

Dots (3)

Located at intersections of corresponding crosshatch patterns; white dots on black background; single center dot, 7 x 11 and 15 x 21 patterns.

Crosshatch (3)

White lines on black background; center cross, 7 x 11 and 15 x 21 patterns.

Vertical Lines (3)

White line on black backgrounds; 1, 11 and 21 lines.

Horizontal Lines (3)

White lines on black background; 1, 7 and 15 lines.

Gray Raster

0 % level black raster.

Subcarrier

Continuous color subcarrier, no sync.

Video Carrier

Unmodulated RF carrier (CH5 and CH6).

SYNCHRONIZATION

Type Generation

Crystal controlled progressive scanning.

Horizontal Frequency

15.75 kHz.

Vertical Frequency

60.11 Hz.

RF/IF OUTPUTS

Frequencies

RF CH-5 77.25 MHz; RF CH-6 83.25 MHz; IF 45.5 MHz.

Impedance

300 Ω , unbalanced.

Level

10 mV (open circuit).

COMPOSITE VIDEO OUTPUT

Level

2 V pp (open circuit).

Impedance

10 k Ω .

Polarity

Negative sync signal.

TRIGGER OUTPUT

Frequency

Line or Field rate.

Level

5 V p-p (open circuit).

Output Impedance

1 k Ω .

POWER REQUIREMENTS

Internal: Four (4) "C" cells (not supplied).

External: 6 Vdc, 300 mA.

With Optional Adapter: 117 Vac,

50-60 Hz.

Size (WxHxD)

6 $\frac{1}{8}$ x 2 $\frac{1}{4}$ x 4 $\frac{3}{8}$ in.

156 x 57 x 111 mm.

Weight

1.5 lbs, 0.7 kg.

ACCESSORIES SUPPLIED

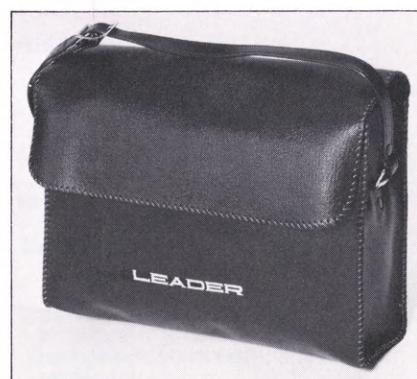
Instruction Manual.

One (1) RF/IF cable (alligator clips).

Three (3) Test leads.

ACCESSORIES AVAILABLE

Type LPS-166F ac Adapter.



CC-851 Carrying Case

C/MATV Field Strength Meter



LFC-944B

The LFC-944B is a portable battery operated field strength meter designed for testing and measuring the performance of CATV and MATV systems. It provides for measuring levels of -40 to +60 dB_{mv} on VHF channels and -30 to +40 dB_{mv} on UHF channels. The meter scale is also calibrated to make measurements in microvolts. An accurate attenuator provides up to 70 dB attenuation in 10 dB steps. Accurate detent tuning is provided for VHF channels and UHF tuning for channels 14 to 83 is with a continuous control. The LFC-944B is supplied with a sturdy carrying case.

SPECIFICATIONS

Range

VHF, -40 to +60 dB_{mv} (10 μV to 1 V);
UHF, -30 to +40 dB_{mv} (30 μV to 0.1 V).

Accuracy

VHF, ± 3 dB;
UHF, ± 4 dB.

Amplifier Bandwidth

1 MHz at 3 dB points.

Input Impedance

75 Ω.

Power Requirements

13.5 Vdc using 9 Type "C" cells.

Size (WxHxD)

8 x 4 x 8 in.
200 x 100 x 200 mm.

Weight

5.7 lbs, 2.6 kg.

ACCESSORIES SUPPLIED

One (1) 300:75 ohm matching coupler.
One (1) Earphone for monitoring video carrier.
One (1) Carrying Case.

LCC-138 VHF-TV Signal Source



LCC-138

The LCC-138 is a calibrated source of test signals for injection into MATV and CATV systems. Used in conjunction with the LFC-944B VHF/UHF Field Strength Meter, it permits accurate, quantitative measurements of cable losses, amplifier gain, and overall system gain or loss.

This compact, battery operated unit provides calibrated test signals on channels 2, 3, 12 and 13 from 0 to 40 dB_{mv} in 10 dB steps.

SPECIFICATIONS

Frequencies

CH 2, CH 3,
CH 12, CH 13.

Frequency Accuracy

± 1%.

Output Levels

0 to 40 dB_{mv} in 10 dB steps.

Output Level Accuracy

± 2 dB.

Output Impedance

75 Ω.

VSWR

1.3:1 max.

Power Requirements

Eight (8) type "AA" cells.

Size (W x H x D)

6 1/8 x 2 1/8 x 7 7/8 in.
155 x 55 x 200 mm.

Weight

3 lbs, 1.3 kg.

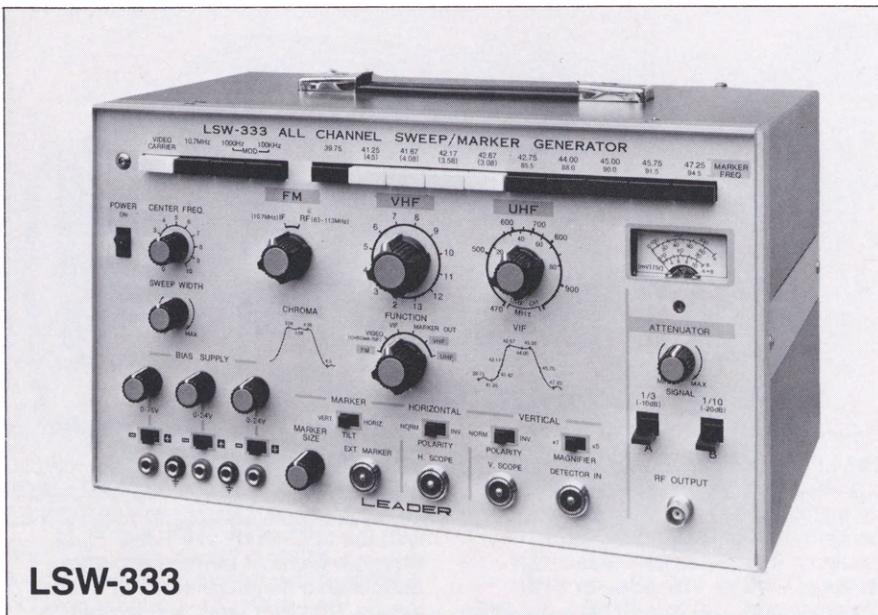
ACCESSORIES SUPPLIED

One (1) Instruction Manual.
One (1) Carrying Case.
One (1) Test Cable.

ACCESSORIES AVAILABLE

LPS-168 ac Adapter

All-Channel Sweep/Marker Generator



LSW-333

The LSW-333 is a complete test and alignment instrument for the RF and IF tuned circuits of VHF and UHF television receivers and FM radios. It is used in production testing and aligning, and in servicing. Front-panel displays of ideal IF and chroma response curves with marker positions permit fast and precise alignment in accordance with manufacturers' recommendations. The LSW-333 has three bias supplies, selectable marker tilt (vertical or horizontal), and vertical and horizontal polarity reversal.

SPECIFICATIONS

Marking Method

Post injected birdy type.

Sweep Rate

60 Hz.

Sweep Linearity

Within 10% (3 point method).

Output Voltage

Over 100 mVrms into 75 Ω .

Output Impedance

75 Ω , unbalanced.

Output Control

30 dB in 10 dB steps and variable (40 dB range); 30 dB in 10 dB steps (UHF only).

Marker Size

0 to 1 volt p-p, adjustable.

Marker Tilt

Vertical or horizontal.

Display Polarity

Normal or inverted for vertical and/or horizontal axes.

Bias Supplies

Two, 0 to \pm 25V;
One, 0 to \pm 75V.

Horizontal Out

10 V p-p, special 15.75 kHz. filter for line rate suppression.

Power Requirements

115 Vac, 50 to 60 Hz, 8 VA

Size (W x H x D)

13 $\frac{3}{8}$ x 8 $\frac{1}{2}$ x 8 $\frac{1}{2}$ in.
350 x 216 x 216 mm.

Weight

11 lbs, 5 kg.

FREQUENCY DATA

Band	Freq. (MHz)	Cent. Freq. (MHz)	Width Sweep (MHz)	Markers, (MHz)
VHF	Channels 2-13	Center of Channel	8 MHz	39.75, 41.25, 41.67, 42.17, 42.67, 42.75, 44.00, 45.00, 45.75, 47.25. A separate 45.75 video carrier is available on all channels at 10 dB below 45.75 marker.
UHF	470-890 MHz	Center, Continuously Variable	8 MHz	41.25, 41.67, 42.17, 42.67
FM-RF	83-113 MHz	98 MHz	30 MHz	85.5, 88.0, 90.0, 91.5, 94.5.
FM-IF	10.7 MHz	10.7 MHz	1 MHz	10.6, 10.7, 10.8.
Video (Chroma & Sound IF)	1.8-5.5 MHz	—	3.7 MHz	\pm 100 KHz side markers & \pm 1 KHz modulation may be applied.
Video IF	39-48 MHz	43.5 MHz	8 MHz	39.75, 41.25, 41.67, 42.17, 42.67, 42.75, 44.00, 45.00, 45.75, 47.25.
Video Sweep	0-6 MHz on 45.75 MHz	45.75 MHz	6 MHz	—
Video IF	All Markers (39.75, 41.25, 41.67, 42.17, 42.67, 42.75, 44.00, 45.00, 45.75, 47.25) available separately with 1000 Hz or 100 KHz modulation applied.			

2-MHz Sweep/Function Generator



The LFG/1300S is a general-purpose signal source with a broad range of research, design and service applications. Outputs include sine, square, triangle, ramp and pulse signals. Pulse symmetry is variable over a 9:1 range and, unlike many other instruments, changing the symmetry does not appreciably affect the output frequency. Linear and logarithmic sweep frequency outputs are available with sweep widths up to 1,000:1. Output level is controlled by a calibrated 70-dB attenuator (10-dB/step) with continuous adjustment between steps. The output may be frequency or amplitude modulated by an external signal. A level control also provides suppressed carrier outputs. The LFG-1300S is housed in a sturdy metal housing with a "human-engineered" front panel for convenient, simple operation.

SPECIFICATIONS

FREQUENCY

Ranges (0.02 Hz–2 MHz in 8 ranges, uncalibrated to 0.002 Hz):

0.02 Hz–0.2 Hz.
0.2 Hz–2 Hz.
2 Hz–20 Hz.
20 Hz–200 Hz.
200 Hz–2 kHz.
2 kHz–20 kHz.
20 kHz–200 kHz.
200 kHz–2 MHz.

Accuracy

0.02 Hz to 200 kHz: $\pm 3\%$ of reading, $\pm 3\%$ full scale.
200 kHz to 2 MHz: $\pm 5\%$ of reading, $\pm 3\%$ full scale.

WAVEFORMS

Sine Wave

Voltage: 20 V p-p (7 V rms) open circuit.
Distortion: 0.02 Hz–100 kHz less than 1%, 100 kHz–2 MHz less than 3%.
Flatness: 0.02 Hz–2 MHz within ± 0.3 dB.

Triangle

Voltage: 20 V p-p open circuit.
Symmetry: 1% (0.02 Hz to 100 KHz).

Sawtooth

Voltage: 20 V p-p open circuit.
Symmetry: 15:85 or 85:15 fixed.

Square Wave Output

Voltage: 20 V p-p open circuit.
Symmetry: 1% (0.02 Hz to 100 KHz).
Rise Time: Less than 100 ns.

Pulse

Voltage: 20 V p-p open circuit.
Symmetry: 1:1–40:1 Continuously Variable.

Polarity: – and +.

TTL Output

Fan Out: 20 TTL.

DC Level

Controlled by dc Offset: ± 10 V.

SWEET CAPABILITIES

Type

Linear or Logarithmic.

Rate (duration)

0.5 Hz to 50 Hz (2 s to 20 ms).

Width

1,000:1 max, continuously variable.

Ramp Output (for oscilloscope H-input)

0 to + 10 V.

AM Capabilities

Modulation Level: 0 to 100% continuously variable.

Carrier Level: Adjusted by front panel control.

OUTPUT LEVEL CONTROL

Attenuator

10, 20, 40 dB (0-70 dB, 10 dB steps).

Impedance

50 Ω .

Max Level

20 V p-p adjustable.

REAR PANEL INPUTS

VCO

Input for external frequency control signal.

MOD

Input for AM signal.

GCV

Output for oscilloscope H-Axis.

TTL

Fixed level TTL output, fan out = 20.

Audio and RF Signal Generators



LAG-26



LSG-16

Stable, durable and economical, the LAG-26 (audio) and LSG-16 (RF) signal generators are a proven pair of performers widely used in education, service shops, home, and industry. The LAG-26 provides both low-distortion sine and rapid-rise square waves that are free-running or externally synchronized. It has four ranges to 200 kHz with vernier frequency control and variable output level. The LSG-16 uses solid-state FET circuitry to provide 5 fundamental frequency bands from 100 kHz to 100 MHz and a sixth harmonic band to 300 MHz. It has a vernier frequency control with switchable high and low level outputs. Crystal-controlled outputs from 1 to 15 MHz are also available by front-panel plug-in of the appropriate Type FT-243 crystal.

SPECIFICATIONS

LAG-26 Audio Signal Generator

Frequency Range

20 Hz to 200 kHz in four decade bands.

Calibration Accuracy

$\pm (3\% + 2 \text{ Hz})$ direct reading.

Sync Signal

1 V for $\pm 3\%$ frequency control.

Sine Wave Output

Range, 20 Hz-200 kHz;
voltage, 0-5 Vrms;
flatness, ± 1 dB, ref. 1 kHz;
Distortion, less than 0.5 %, below
20 kHz.

Square Wave Output

Range, 20 Hz-20 kHz;
voltage, 0-10 Vp-p;
rise time, 0.5 μ s.

Power Supply

115/230 Vac, 50/60 Hz; 3 VA approx.

Size (W x H x D)

10 x 6 x 5 in.
150 x 250 x 125 mm.

Weight

5.5 lbs, 2.5kg.

LSG-16 RF Signal Generator

Frequency Range

100 kHz to 100 MHz. Up to 300 MHz
on harmonics.

RF Output

100 mVrms max.

Output Control

High-Low switch & fine adjuster.

Modulation

Int, 1 kHz @ 30 % or higher;
Ext, 50 Hz-20 kHz @ less than 1 Vrms.

Audio Output

1 kHz at 0.1 Vrms.

Crystal Oscillator

For 1-15 MHz (crystal not included);
type FT-243.

Power Requirements

115/230 Vac, 50/60 Hz. 3 VA approx.

Size (W x H x D)

10 x 6 x 5 in.
150 x 250 x 125 mm.

Weight

5.5 lbs, 2.5kg.

Audio Frequency Response Recorder



LFR-5600

The LFR-5600 is a complete, self-contained system for measuring and recording the frequency response of a broad range of audio equipments. It employs an audio sweep oscillator, level meter and chart recorder to automatically produce frequency response curves from 20 Hz to 30 kHz with 0.5 dB accuracy. Automatic start/stop circuitry using either 333 Hz or 1 kHz pilot signals greatly simplifies measurements on recording equipment and systems. An accurate attenuator (0, 20, 40 dB) permits use with a wide range of signal levels including those of sensitive preamplifiers. Both linear and logarithmic (25 and 50 dB range) recordings may be made within one minute. In addition, a faster sweep rate is provided for use with an oscilloscope. Manual sweep is also possible. A panel meter monitors input/output levels and sweep oscillator frequency. Accessories available include the LEA-5610 Equalizer/Amplifier for phono cartridge measurements and the LSP-5621 Speaker Analyzer for loudspeaker measurements.

SPECIFICATIONS

INPUT SECTION

Frequency Range
20 Hz to 30 kHz.

Impedance
500 KΩ, 50 pF

Voltage Ranges
0 dB = 0.1 V, 1 mV to 3.16 V
(-60 to +10 dB);
0 dB = 1 V, 10 mV to 31.6 V
(-40 to +30 dB);
0 dB = 10 V 100 mV to 316 V
(-20 to +50 dB).

Accuracy (ref 0 dB at 1 kHz)
dB scale, ± 0.5 dB; linear scale,
± 2% of full scale.

Frequency Response (ref 0 dB at 1 kHz)

Indication (dB)	1 to 20 kHz	20 to 30 kHz
+10	± 0.5 dB	± 0.5 dB
0	± 0.5 dB	± 0.5 dB
-10	± 0.5 dB	± 0.5 dB
-20	± 0.5 dB	± 1 dB
-30	± 1 dB	± 1.5 dB
-40	± 1.5 dB	± 2 dB

Span Range

25 dB, 50 dB, linear.

Detection Method

Average responding.

Response Time

Selectable 0.1, 0.2, 0.5 and 1 s.

Auto 0 dB Referencing

Reference frequency, 333 Hz or 1 kHz; capture range, within ± 10 dB of range setting.

METERING SECTION

Frequency

Range is 20 Hz to 30 kHz; accuracy is ± 3% ± 2 Hz ± 5% full scale.

Input or Output Level

Ranges are 0 to 0.3, 3 and 30 V full scale (-30 to -10 dB_V, -10 to +10 dB_V and 0 to +20 dB_V); accuracy is ± 5% of full scale.

SWEEP OSCILLATOR SECTION

Frequency Range

20 Hz to 30 kHz.

Pilot Frequencies

333 Hz and 1 kHz.

Output Level

3 V max.

Attenuator

0, -20, and -40 dB; ± 2%.

Impedance

600 Ω.

Frequency Response

20 Hz to 10 kHz; ± 0.2 dB; 10 kHz to 30 kHz; ± 0.5 dB.



LEA-5610

Distortion

20 Hz to 100 Hz, 0.9%;
100 Hz to 1 kHz, 0.6%;
1 kHz to 5 kHz, 0.6%;
5 kHz to 10 kHz, 0.7%;
10 kHz to 20 kHz, 1%;
20 kHz to 30 kHz, 1.4%.
333 Hz and 1 kHz ref, 0.1%.

Operating Modes

Manual sweep using front panel frequency control and automatic (logarithmic frequency vs. time).

Sweep Rates

Settings for 0.1, 0.3, 1 and 3 mm/s chart speed and 10 s sweep duration for oscilloscope display.

Sweep Sequence (at 3 mm/s Chart Speed)

Pilot signal 5 seconds; sweep signal 54 seconds; and zero level signal (for S/N measurements) 8.5 sec.

RECORDING CONTROL SECTION

Chart Speeds

0.1, 0.3, 1 and 3 mm/s automatically synchronized with sweep rates.

Start Methods

Manual by push button or automatic by detection of pilot signal. (333 Hz or 1 kHz)

CHART RECORDER

Writing Method

Liquid ink pen

Chart Size

Overall width is 73 mm with a 50 mm writing width; rolls are 60 m long.

DC Recording Capabilities

Input ranges are 10, 100 and 1,000 mV/cm within ± 2% full scale accuracy; input impedance is 500 KΩ, 500 pF.

POWER REQUIREMENTS

100, 117, 200, 230 Vac, 50 to 60 Hz, 28 VA (normally supplied wired for 117 Vac).

PHYSICAL

Size (W x H x D)

15 1/4 x 5 7/8 x 9 7/8 in.
400 x 150 x 250 mm.

Weight

21 lbs, 9.5 kg.

ACCESSORIES SUPPLIED

1 ea BNC to Clips.
1 ea BNC to Pin Plug.
1 ea Pin Plug to Pin Plug.
1 ea Pin Plug to Clips.
1 ea Pin Plug to Miniplug.
LI-068 50 cc Red Ink.
1 Roll LC-057 Linear Chart Paper.
1 Roll LC-056 Log Chart Paper.

Audio Analyzer



The LAS-5500 is a complete, all-in-one audio test center widely used in sound engineering, high-fidelity equipment testing and repair, in recording studios, and for production-line testing. It combines in one unit, an oscilloscope, audio oscillator, ac millivolt meter, and a wow/flutter/drift meter. The dc to 5 MHz, 10 mV oscilloscope has selectable input attenuation (X1, X10, X100, X 1000) and sweep frequencies (10 Hz, 100 Hz, 1000 Hz, 10 kHz, 100 kHz), plus continuous fine adjustment. The five-range, 10 Hz to 100 kHz audio generator features a 0 to 101 dB calibrated output attenuator with 0.1 dB steps and $\pm 2\%$ accuracy. Distortion is less than 0.05% between 500 Hz and 20 kHz. The ac millivolt meter has 12 ranges from 30 μ V to 100 Vrms with 3% full scale accuracy and a 5 Hz to 500 kHz frequency response. Wow and flutter measurements are made to CCIR, DIN, and JIS standards with $\pm 5\%$ accuracy. Drift measurements are also accurate within $\pm 5\%$. This combination of instruments in a single package permits making a wide variety of audio measurements without cluttering the work bench with up to seven separate instruments. In addition, connections between instruments can be made internally with front panel switches, thereby eliminating the need for external cables and cords.

SPECIFICATIONS

AUDIO GENERATOR

Frequency Range 10 Hz to 1 MHz in 5 ranges.

Frequency Accuracy 10 Hz to 100 Hz: $\pm 5\%$.
100 Hz to 1 MHz: $\pm 3\%$.

Wave Form

Sine wave.

Output Level

Up to 3 Vrms, 600 Ω .

Distortion

10 Hz to 1 MHz, $<1\%$;
50 Hz to 500 kHz, $<0.5\%$;
100 Hz to 100 kHz, $<0.1\%$;
500 Hz to 20 kHz, $<0.05\%$.

AUDIO ATTENUATOR

Range 0 to 101 dB in 0.1 dB steps.

Accuracy

$\pm 2\%$.

Input/Output Impedance

600 Ω .

Frequency Response

dc to 200 kHz.

AC MILLIVOLT METER

Range

0.3 mV to 100 V in 12 ranges;
- 90 to + 42 dB (0 dB = 0.775 V) and
- 90 to + 40 dB (0 dB = 1 V).

Accuracy

$\pm 3\%$ full scale at 1 kHz.

Frequency Response

20 Hz to 100 kHz, $\pm 3\%$;
10 Hz to 200 kHz, $\pm 5\%$;
5 Hz to 500 kHz, $\pm 10\%$.

Input Impedance

10 M Ω , 65 pF.

DUMMY LOAD

Dissipation

50 W per channel (2 channels).

Impedance

8 Ω .

WOW, FLUTTER AND DRIFT METER

Reference Frequency

3 kHz $\pm 10\%$ or 3.15 kHz $\pm 10\%$ (switchable).

Input Level Requirement

15 mV to 10 Vrms.

Drift Measurement Range

0 to $\pm 5\%$.

Drift Accuracy

Within 0.25%.

WOW & Flutter Ranges

0 to 0.03, 0.1, 0.3, 1 and 3% full scale.

WOW & Flutter Accuracy

Within 0.05 times full scale value.

Frequency Response (-3 dB ± 1 dB)

CCIR, 0.3 to 20 Hz;
JIS, 0.5 to 200 Hz; and
DIN, 0.3 to 300 Hz.

Internal Test Frequency Source

3 kHz $\pm 0.05\%$, 0.3 Vrms.

Output Impedance

5 k Ω .

OSCILLOSCOPE

Display

3 in CRT, P31 phosphor, 8 x 10 div.

Vertical Amplifier

Sensitivity is 10 mV/div with a 5 MHz bandwidth (-3 dB); input impedance is 1 M Ω (40 pF) with a 4-step attenuator (Times 1, 10, 100, and 1000) that is continuously variable between steps.

Horizontal Amplifier

Sensitivity is 20 mV/div to 10 V/div;
Bandwidth is dc to 250 kHz (-3 dB).

Time Base

Triggered Sweep from 10 Hz to 100 kHz in four ranges.

POWER REQUIREMENTS

100, 115, 200, 230 Vac, 50 to 60 Hz,
36 VA (normally supplied for 115 Vac operation).

PHYSICAL

Size (W x H x D)

17 $\frac{3}{4}$ x 5 $\frac{7}{8}$ x 16 $\frac{1}{8}$ in.
450 x 150 x 430 mm.

Weight

25 lbs, 11.5 kg.

ACCESSORIES SUPPLIED

Instruction Manual.
Protective Front Cover.
LP-16AY Oscilloscope Probe.
Three (3) Test Cables, Banana
Plug/Alligator Clips.
Two (2) Test Cables, Photo Plug/Phono
Plug.
Two (2) Adapters, UHF Plug/Screw
Terminal.

ACCESSORIES AVAILABLE

Type TR-39 Test Record.
Type TC-39 Test Tape (Cassette).

Wow and Flutter Meter



LFM-39A

The LFM-39A is a precision audio instrument which incorporates all of the functions required to measure wow and flutter as low as 0.003% and drift as low as 0.25% in turntables, tape decks and other record/playback equipment. Measurements on turntables are made using an optional test record which has been accurately recorded with 3 kHz and 3.15 kHz test tones. Measurements on tape playback equipment can be made using an optional test tape with similar test tones. An internal 3 kHz reference oscillator (3.15 kHz is available as an option) permits measuring the combined contributions to wow, flutter and drift of both the record and playback functions in tape recorders. In all cases wow and flutter may be measured either separately or combined.

The LFM-39A permits making measurements to either CCIR, JIS or DIN standards. (The optional 3.15 kHz reference oscillator is required for DIN measurements of recording equipment.)

SPECIFICATIONS

INPUT REQUIREMENTS

Frequency

3 kHz \pm 10% (CCIR, JIS) and
3.15 kHz \pm 10% (DIN).

Level

15 mV to 10 Vrms.

Input Impedance

300 k Ω .

DRIFT MEASUREMENTS

Range

0 to \pm 5% full scale.

Accuracy

Within \pm 0.25%.

WOW AND FLUTTER MEASUREMENTS

Range

0.003 to 3% in 5 ranges
(0.03, 0.1, 0.3, 1 and 3% full scale).

Accuracy

Within \pm 0.05 times full scale.

Frequency Characteristics

MEASUREMENT STANDARD	FREQ. RANGE (-3 dB \pm 1 dB)	
W & F	CCIR	0.3 to 200 Hz
	JIS	0.5 to 200 Hz
	DIN	0.3 to 300 Hz
WOW	CCIR, DIN	0.3 to 6 Hz
	JIS	0.5 to 6 Hz
FLUTTER	CCIR, JIS	6 to 200 Hz
	DIN	6 to 300 Hz

REFERENCE OSCILLATOR

Frequency

3 kHz, within \pm 0.1%
(3.15 kHz available as an option).

Output Level

0.3 Vrms, \pm 10%.

OSCILLOSCOPE OUTPUT

Level

1 Vrms \pm 10% corresponds to full scale indication.

Impedance

2 k Ω (optimum load $>$ 20 k Ω).

RECORDER OUTPUT

Level

1 Vdc \pm 10% corresponds to full scale indication.

POWER REQUIREMENTS

115, 230 Vac; 50-60 Hz; 15 VA;
(normally supplied for 115 Vac operation).

PHYSICAL

Size (W x H x D)

9 $\frac{1}{8}$ x 5 $\frac{1}{8}$ x 9 $\frac{1}{8}$ in.
250 x 150 x 250 mm.

Weight

10 lbs., 4.5 kg.

ACCESSORIES SUPPLIED

One (1) Instruction Manual.

ACCESSORIES AND OPTIONS AVAILABLE

Type TR-39 Test Record.

Type TC-39 Test Tape (Cassette).

Model LFM-39A-01. Similar to above but with both 3 kHz and 3.15 kHz reference oscillators.

Single and Dual Channel AC Millivoltmeters



LMV-181A



LMV-185A

The LMV-181A and LMV-185A are general purpose, average responding ac voltmeters with a measurement range of $100 \mu\text{V}$ to 300 V. Bandwidth is 5 Hz to 1 MHz, permitting use in a broad range of applications including audio, IF and ultra-sonic circuits and systems.

The meter scales are conveniently calibrated in both millivolts and dB (0 dB = 1 V and 0 dB = 0.775 V). Output terminals on both models permit using these instruments as sensitive, accurate pre-amplifiers.

The LMV-185A is a dual channel instrument employing a dual movement meter and concentric range switches for each channel. This permits convenient measurement and comparison of input/output levels and direct indications of gain/attenuation.

Both the LMV-181A and LMV-185A are accurate to within $\pm 2\%$ f.s.

SPECIFICATIONS

METER

Voltage Range

100 μV to 300 V in 12 ranges,
-60 to +50 dB.

Accuracy

$\pm 2\%$ of full scale at 1 kHz or 400 Hz.

Frequency Response (1 kHz ref.)

5 Hz to 1 MHz, $\pm 10\%$;
10 Hz to 500 kHz, $\pm 5\%$;
20 Hz to 200 kHz $\pm 2\%$.

Input Impedance

10 M Ω , 50 pF.

Maximum Input

600 V (dc plus ac peak).

Noise

Less than 2% full scale.

AMPLIFIER

Output

1 V (no load) corresponds to a full scale indication on each range.

Frequency Response (1 kHz ref.)

10 Hz to 500 kHz, -3 dB.

Output Impedance

600 Ω , $\pm 20\%$.

Distortion (1 kHz)

<1% full scale.

ENVIRONMENTAL

Operating Temperature

0-40° C

Operating Humidity

85%.

POWER REQUIREMENTS

100, 115, 200, 230 Vac, 50 to 60 Hz, 2.5 VA; normally supplied for 115 Vac operation.

PHYSICAL

Size (H x W x D)

5 $\frac{1}{8}$ x 5 $\frac{1}{4}$ x 9 $\frac{7}{8}$ in.
150 x 132 x 250 mm.

Weight

0.5 lb, 0.2 kg.

ACCESSORIES SUPPLIED (LMV-181A)

One (1) Instruction Manual.
One (1) Test Cable (banana plugs to alligator clips).
One (1) Adapter, UHF to banana jack.

ACCESSORIES SUPPLIED (LMV-185A)

One (1) Instruction Manual.
Two (2) Test Cables (banana plugs to alligator clips).
Two (2) Adaptors, UHF to banana jack.

Audio Sine/Square Wave Generators

LAG-120A



LAG-125



The LAG-120A and LAG-125 are 10 Hz to 1 MHz precision audio generators used for designing, testing and servicing amplifiers, loudspeakers... any application requiring low-distortion sine waves or fast rise-time square waves. Both units have five frequency ranges with 3% dial accuracy above 100 Hz and a $\pm 1\%$, 50 dB output attenuator selectable in 10 dB increments with continuous fine adjustment. Sine wave distortion ranges from less than 0.03% between 500Hz and 20kHz to less than 1% over the full frequency range. Square wave rise time of the LAG-125 is less than 150 ns, less than 200 ns for the LAG-120A. The LAG-125 also has an output level meter and a burst signal that is gated for loudspeaker testing.

SPECIFICATIONS

LAG-120A

FREQUENCY

Range

10 Hz to 1 MHz in 5 decade ranges.

Accuracy

$\pm (3\% + 1\text{ Hz})$.

SINE WAVE

Level

3 Vrms, 600 Ω .

Distortion

500 Hz to 20 kHz, 0.05%;
50 Hz to 200 kHz, 0.4%;
20 Hz to 500 kHz, 0.8%.

SQUARE WAVE OUTPUT

Level

3 V p-p, 600 Ω .

Rise Time

200 ns.

EXTERNAL SYNCHRONIZATION

Lock Range

$\pm 1\%$ of dial frequency per volt rms of input signal.

Maximum Input

10 Vrms.

Input Impedance

10 k Ω .

GENERAL OUTPUT CHARACTERISTICS

Impedance

600 Ω unbalanced.

Frequency Response

± 0.5 dB into 600 Ω load (1 kHz ref).

Amplitude Control

-50 to +12 dBm;
2.4 mV to 3 Vrms
(0-50 dB step attenuator, 10 dB steps).

POWER REQUIREMENTS

100, 115, 200, 230 Vac,
50 to 60 Hz, 12 VA; normally supplied for 115 Vac operation.

PHYSICAL

Size (W x H x D)

5 $\frac{1}{4}$ x 6 $\frac{3}{4}$ x 12 in.
132 x 170 x 300 mm.

Weight

6.5 lbs., 3 kg.

ACCESSORIES SUPPLIED

Instruction Manual.
Type LJ-10 600 Ω terminator.

SPECIFICATIONS

LAG-125

FREQUENCY

Range

10 Hz to 1 MHz in 5 decade ranges.

Accuracy

$\pm 3\%$.

SINE WAVE OUTPUT

Level

3 Vrms, 600 Ω .

Distortion

500 Hz to 20 kHz, 0.03%;
100 Hz to 100 kHz, 0.1%;
50 Hz to 500 kHz, 0.5%;
10 Hz to 1 MHz, 1%.

SQUARE WAVE OUTPUT

Level

3 Vp-p, 600 Ω .

Overshoot

<3% at maximum output.

Sag

<5% at 10 Hz.

Rise Time

0.15 μ s (0.45 μ s unterminated).

BURST OUTPUT

Type

Gated sine wave.

Level

1.5 V p-p, 600 Ω .

Gating Intervals

(1) 4 cycles on, 4 cycles off;
(2) 4 cycles on, 12 cycles off;
(3) 8 cycles on, 8 cycles off.

Leakage

<2% during off interval at 20 kHz.

EXTERNAL SYNCHRONIZATION

Lock Range

$\pm 0.5\%$ of dial frequency per volt rms of input signal.

Maximum Input

10 Vrms.

Input Impedance

10 k Ω .

GENERAL OUTPUT CHARACTERISTICS

Impedance

600 Ω unbalanced/floating.

Frequency Response

± 0.3 dB at 600 Ω unbalanced output.

Amplitude Control

-50 to +10 dBm;
2.45 mV to 3.1 Vrms
(0-50 dB step attenuator, 10 dB steps).

OUTPUT METER

Range

0 to 1 and 0 to 3 Vrms;
-10 to +2 dB (0 dB = 0.775 V).

Accuracy

$\pm 5\%$ full scale.

POWER REQUIREMENTS

100, 115, 200, 230 Vac,
50 to 60 Hz, 12 VA; (normally supplied for 115 Vac operation).

PHYSICAL

Size (W x H x D)

7 $\frac{1}{8}$ x 6 x 9 $\frac{1}{8}$ in.
200 x 150 x 250 mm.

Weight

12 lbs., 5.5 kg.

ACCESSORIES SUPPLIED

Instruction manual.
Test cables, banana plugs to alligator clips.

Distortion Meter



LDM-170

The LDM-170 is a compact, versatile instrument for measuring distortion, signal-to-noise ratio and signal levels in audio equipment and systems.

Total distortion measurements of 0.01 to 100% can be made over a frequency range of 20 Hz to 20 kHz. Signal to noise ratio measurements can be made up to 70 dB with signal levels from 0.35 to 30 Vrms. Audio level measurements from 100 μ V to 300 Vrms can be made up to 200 kHz with \pm 5% full-scale accuracy. These broad measurement capabilities and the moderate cost of the LDM-170 make it ideal for many applications including broadcast equipment testing, audio circuit design, consumer audio product servicing and communication system evaluation.

SPECIFICATIONS DISTORTION MEASUREMENTS

Ranges
0.3, 1, 3, 10, 30 and 100% full scale.

Accuracy
Within 0.05 times full scale.

Frequency Range
20 Hz to 20 kHz in three ranges.

Input Level Range
0.35 to 30 Vrms.

Input Impedance
100 k Ω , 50 pF.

Fundamental Frequency Suppression
Over 70 dB.

Residual Distortion
0.03% max.

SIGNAL-TO-NOISE RATIO MEASUREMENTS

Range
0 to 70 dB below ref. level.

Input Level
0.35 to 30 V rms.

LEVEL MEASUREMENTS

Range
1 mV to 300 V rms full scale in 12 ranges, minimum reading 100 μ V.

Accuracy
 \pm 5% of full scale.

Frequency Range
20 Hz to 200 kHz.

Highpass Filter
Cutoff at 500 Hz, 6 dB/Octave.

Output Level
1 Vdc corresponds to full scale indication.

POWER REQUIREMENTS

100, 115, 230 Vac, 50 to 60 Hz, 5 VA;
(normally supplied for 115 Vac operation).

PHYSICAL

Size (W x H x D)
11 $\frac{3}{4}$ x 5 $\frac{7}{8}$ x 9 $\frac{7}{8}$ in.
300 x 150 x 250 mm.

Weight
13 lbs, 6 kg.

ACCESSORIES SUPPLIED

Instruction manual.
Test cable, dual banana plug to alligator clips.

LSG-231 FM Stereo Signal Generator



LSG-231

The LSG-231 is a compact instrument which provides all of the signals required for testing, troubleshooting and aligning FM multiplex receivers and tuners. The RF output is a complete FM stereo broadcast signal with 50 dB channel separation. An internal 1 kHz signal may be applied to either or both audio channels, in or out of phase. Other outputs include composite, pilot and 1 kHz audio signals. The LSG-231 may also be modulated by external audio signals in the 50 Hz to 15 kHz range with switchable pre-emphasis of 50 or 75 μ s.

SPECIFICATIONS

RF OUTPUT

Carrier Frequency

100 MHz, ± 1 MHz adjustable.

Level

0.1, 1, 10 mV switchable, 75 Ω .

Modulation Signals

Composite, L-R, L+R, L, and R (internal 1 kHz); SCA, 67 kHz $\pm 5\%$ or external; external, L and R, 50 Hz to 15 kHz.

Frequency Modulation Levels

Composite, 0-100% (0-75 kHz deviation) adjustable; pilot, 10% (7.5 kHz deviation) adjustable; SCA, 0-20% adjustable.

Modulation Distortion

$<0.5\%$ at 100% modulation.

COMPOSITE SIGNAL OUTPUT

Signal Levels

L-R, L+R, L, and R, 0-1 Vrms adjustable; pilot, 10% (7.5 kHz deviation) adjustable; SCA, 0-20% adjustable.

Impedance

600 Ω , unbalanced.

Subcarrier Leakage

< -40 dB at 100% modulation.

L-R Separation

Internal 1 kHz modulation, >50 dB; external 100 Hz to 3 kHz modulation, >45 dB; external 50 Hz to 15 kHz modulation, >35 dB.

PILOT SIGNAL OUTPUT

Frequency

19 kHz ± 2 Hz.

Level

0.8 Vrms adjustable, 150 Ω unbalanced.

AUDIO OUTPUT

Frequency

1 kHz $\pm 1\%$.

Level

1 Vrms, 1 k Ω .

Distortion

$<0.5\%$.

L AND R AUDIO INPUTS

Level

<1 Vrms.

Impedance

Direct: 100 k Ω .

With pre-emphasis: 10 k Ω .

Pre-emphasis

Off, 50 μ s and 75 μ s switchable.

Frequency Range

50 Hz to 15 kHz.

SCA INPUT

Level

150 mVrms produces 10% modulation (7.5 kHz deviation).

Impedance

100 k Ω .

Frequency Range

10 to 100 kHz.

POWER REQUIREMENTS

100, 115, 200, 230 Vac, 50 to 60 Hz, 10 VA; (normally supplied for 115 Vac operation).

PHYSICAL

Size (W x H x D)

8 x 3 1/8 x 10 in.

200 x 80 x 250 mm.

Weight

5 lbs., 2.3 kg.

ACCESSORIES SUPPLIED

Instruction Manual.

Type LBN-06 Dummy Antenna with BNC connector.

Two (2) test cables, miniature plug to alligator clips.

Two (2) miniature plugs.

Audio Attenuators

Audio Dummy Load



LAT-45



LAT-47

Invaluable for designing, testing and servicing audio equipment, the LAT-45 and LAT-47 audio attenuators provide accurate control over audio voltages and power levels of test equipment, amplifiers, receivers...ideal for accurate measurements of gain-loss characteristics. The LAT-45 has an attenuation range of 0 to 101 dB (dc to 50 kHz), the LAT-47 a range of 0 to 121 dB (dc to 80 kHz). Both units are adjustable in 0.1 dB steps. Both are useable at higher frequencies at reduced attenuation.

SPECIFICATIONS

LAT-45

Attenuation

0 to 101 dB in 0.1 dB steps.

Accuracy

Within \pm 2% at 1 kHz.

Input/Output Impedance

600 Ω , Unbalanced.

Frequency Characteristic

dc to 100 kHz (70 dB).

dc to 50 Hz (101 dB).

Internal Termination

Open or 600 Ω , switched.

Maximum Input

0.5 W (17 Vrms or dc, or +27 dBm).

Size (W x H x D)

11 $\frac{3}{16}$ x 4 x 5 $\frac{3}{8}$ in.

300 x 100 x 150 mm.

Weight

4 lbs, 1.8kg.

LAT-47

Attenuation

0 to 121 dB in 0.1 dB steps.

Accuracy

Within \pm 1.5 % at 1 kHz.

Input/Output Impedance

600 Ω , Unbalanced dc to 100 kHz (70 dB).

Frequency Characteristic

dc to 80 kHz (121 dB).

Internal Termination

Open, or 600 Ω , switched.

Maximum Input

0.5W (17 Vrms or dc, or +27 dBm).

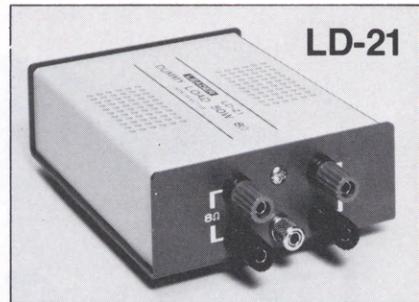
Size (W x H x D)

13 $\frac{3}{4}$ x 3 $\frac{1}{2}$ x 5 $\frac{1}{8}$ in.

350 x 90 x 130 mm.

Weight

5 lbs, 2.3kg.



LD-21

The LD-21 provides two, non-inductive 8-Ohm, 50-Watt loads...ideal for testing stereo amplifiers and the like. Loads may be connected in parallel (4-Ohms) or series (16-Ohms) for 100-Watt dissipation.

SPECIFICATIONS

Channels

Two.

Impedance

8 Ω .

Power

50 Watts per channel.

Connectors

Combination binding post, banana jack.

Size (W x H x D)

4 $\frac{3}{8}$ x 2 x 6 $\frac{1}{2}$ in.

110 x 50 x 165 mm.

Weight

1 lb, 0.45 kg.

Special Products

LEADER designs and manufactures special test equipment for a broad spectrum of industry. Some of these units are shown here. For more information, contact your local sales representative, or LEADER directly.

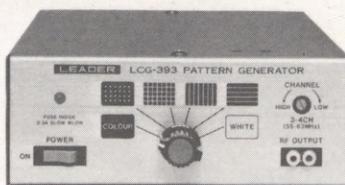
LMG-270



MegOhm Meter

0.1 to 100 MΩ resistance (at 500V).
Ranges for testing insulation and leakage: 150 V, 300 V, 600 Vac full scale.
Accuracy 0.1 to 50 MΩ ± 5% full scale;
0.1 to 100 MΩ ± 10% full scale.
Battery operated.

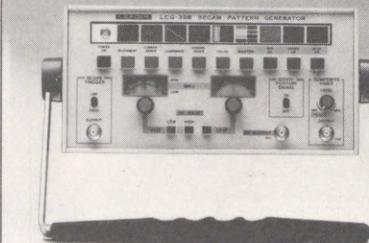
LCG-393



PAL-B Color Bar Generator

6 patterns: color, white raster, dot matrix, line matrix, vertical & horizontal lines.
RF out: 55-63 MHz.
Sync: line, 15.611 kHz; field, 50.036 Hz.
Color sub-carrier: 4.433619 MHz.

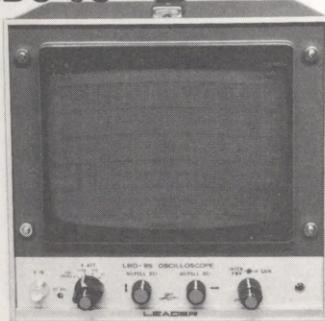
LCG-398



SECAM-III Color Bar Generator

8 color patterns.
Luminance, chrominance, two convergence patterns, individual rasters.
Composite video: 0-1 Vp-p.
RF output: VHF and UHF.
Positive and negative modulation.
Color subcarrier: $f_{OR} = 4.40625$ MHz;
 $f_{OB} = 4.250$ MHz.

LBO-9S



Large Screen Display Oscilloscope

9" display, long persistence CRT, logarithmic graticule.
Sensitivity: 2 mV/cm.
ac-dc coupled.
Bandwidth: (dc) dc-10 kHz; (ac) 2 Hz-10 kHz.

LMV-182A



High Sensitivity AC Millivolt Meter

300 µV full scale.
30 µV to 100 Vrms in 12 Ranges, (-90 dB to +40 dB).
Calibrated in volts and decibels.
Frequency response: 5 Hz to 1 MHz.
Accuracy: ± 2% full scale.

LAV-191



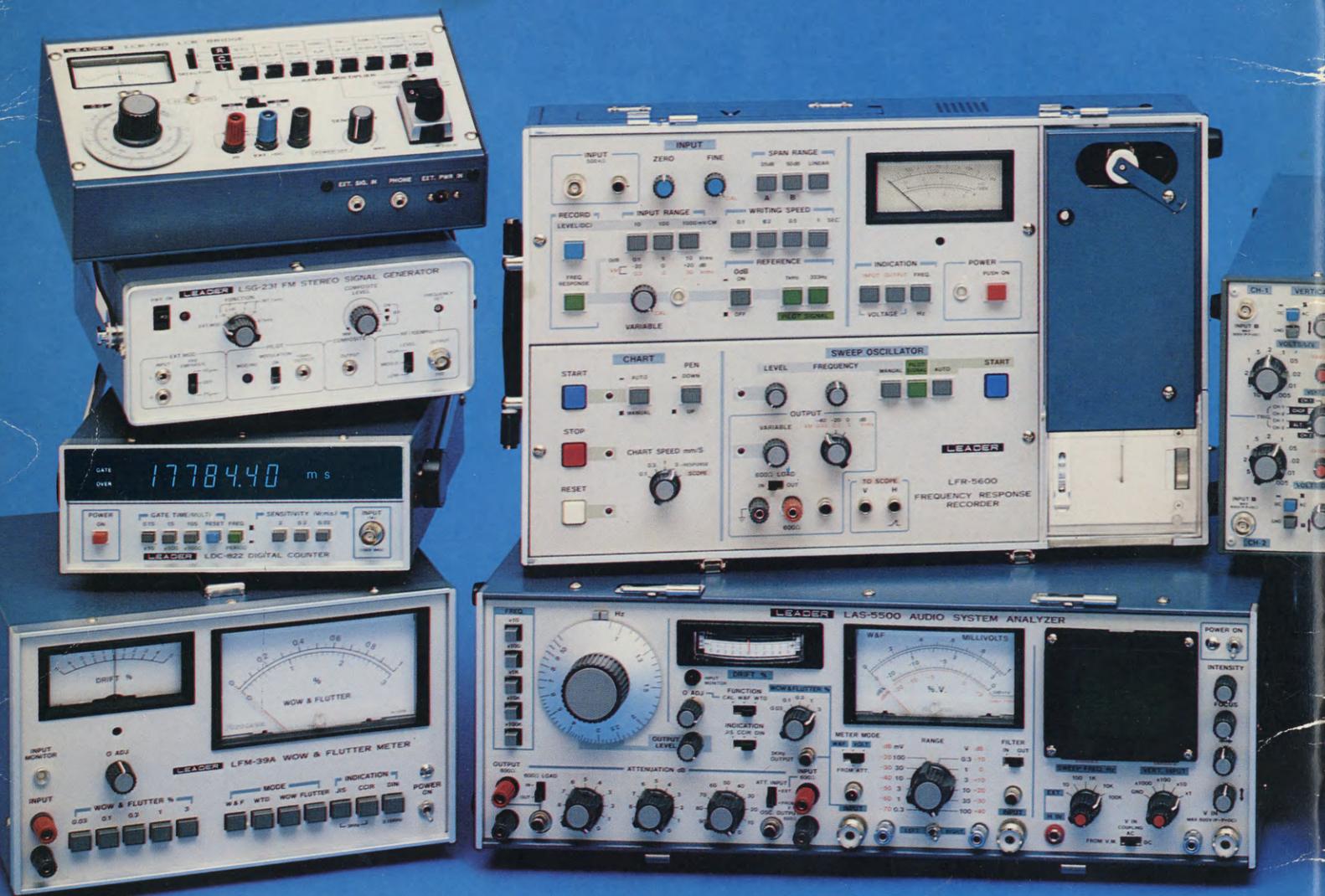
Audio Test Set

Combined ac Voltmeter, Audio Generator and Attenuator.
Sine and square, 10 Hz-1 MHz (5 decade ranges).
Less than 0.05% distortion.
Ac Voltmeter: 1.5 mV to 500 mV full scale, ± 2%.
Attenuator: 0-120 dB in 1 dB steps.

2-YEAR WARRANTY

Leader Instruments Corporation warrants its products to be free from defects in materials and workmanship for a period of two years from the date of purchase. Their obligation under this warranty is limited to repairing or replacing, at their sole option, any such defective products. Products must be returned to a Leader Service Center with transportation charges prepaid and must be accompanied by a brief description of the problem encountered and date and place of purchase. This warranty does not apply to equipment which has been damaged by accident, negligence, or mis-application, or altered or modified in any way.

This warranty applies only to the original purchaser who is requested to return the warranty-registration card within 10 days of purchase.



Get all the facts... Call 800-645-5104 toll free.

Call today for more information and the name of your nearest distributor.
Ask about our free "trial-use" program.

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